



MONASH University

Preventive Healthcare for Young Children in General Practice

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A thesis submitted for the degree of Doctor of Philosophy
at

Monash University in 2017
Department of General Practice

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Abstract

Young children frequently visit general practice with their carers. They usually attend for vaccinations or with short-term illnesses and most general practitioners (GPs) would state they enjoy these interactions. However, despite high levels of preventable health problems that can affect children life-long, young children are missing out on a core aspect of GP care i.e. preventive healthcare. The arrival of the Healthy Kids Check (HKC) in 2008, a health assessment timed to coincide with preschool vaccinations, changed this paradigm. Suddenly, GPs were being asked to review *well* children, to record aspects of health and development not previously considered their domain, but seen as important for successful transition of children into school life and beyond. Unfortunately, the HKC was not embraced by general practice and its low uptake was a major impetus for this thesis. I wanted to discover why delivery was much lower than envisaged, and why in Victoria, where this work was conducted, rates lagged even further behind the other states. Then, leveraging this investigative data, I went on to develop an intervention that used the HKC as a mechanism to deliver more preventive health services and, arguably, more effective preventive care to this vulnerable patient-group. This thesis therefore set out to investigate the reasons for poor uptake of the HKC, describe GPs', nurses', and parents' views of child preventive health and, then, design an intervention to address the barriers to preventive healthcare for young children (including HKCs).

Because there were a number of people, actions and target behaviours integrated in this area of health, I selected a methodology based upon a framework developed by the Medical Research Council (UK), specifically geared to evaluate and develop randomised trials of complex interventions. In 2011, in the initial phase, qualitative methods were used to discover and describe the beliefs, attitudes and behaviours of parents, GPs and practice nurses, when they were asked to consider preventive healthcare for children aged 3 – 5 years. Two theoretical frameworks were used to analyse the data. The first, which applied to the parent study, utilised Andersen's Behavioral Model of Health Service Use. The second, for the study with practitioners, applied Michie et al.'s Theoretical Domains Framework and the related COM-B Model. Thematic analysis of telephone interviews with 28 parents of mixed socio-economic and cultural backgrounds, revealed that preventive healthcare was determined by birth order of the child and, as parents gained confidence, subsequent children were less likely to complete preventive health checks with community nursing services. Cultural health beliefs, personal health practices, relationships with health providers and costs of services all impacted uptake. Additionally, families who held concerns for their child's development sought out information and support through a hierarchy of social contacts before presenting to health services. Six focus group discussions with GPs and practice nurses illustrated how HKCs dichotomised clinical practice: some practitioners embraced them, and HKCs provided the impetus for their professional development, whilst other practitioners shunned them, declaring them tedious and without evidence. Nevertheless, analysis showed interventions could target individual behaviours, through education and training, and re-structure practice systems to streamline delivery of a high-quality HKC.

In 2013, I presented these results to experts outside of general practice, who already had a stake in the healthy growth and development of young children. I sought their advice regarding content and delivery of a ‘whole of practice’ intervention that was, ultimately, devised and tested, in 2014, with three general practices in a low socio-economic area of Melbourne. The multi-faceted intervention proved both feasible and acceptable and, with a few minor moderations, was projected to be tested across a larger number, and a more diverse range of practice communities. In a final step, in 2015, I undertook a systematic review of preventive health interventions to ensure our intervention aligned with others and had not missed any important components.

Following the unexpected removal of government funding for HKCs in 2015, the plan to scale up the intervention, as it had previously been envisaged, was abandoned. Instead, the package of examinations that constituted a HKC were revised to focus on two core evidence-informed components of preventive healthcare –structured developmental surveillance and assessment of body mass index– that were acceptable to practitioners and could be streamlined into *routine* general practice services. This *modified intervention* has become the focus of a major grant proposal.

This thesis brings a detailed description of an implementation science methodology that holds widespread significance for other researchers considering its use in general practice. It provides rich description of parents’ and practitioners’ experiences, beliefs and behaviours around the topic ‘preventive healthcare for young children’ and demonstrates how an intervention can be successfully devised and piloted, ‘bottom-up’. Our formulation of a team-delivered intervention that encompassed practical changes and health-outcomes for children, was both practical and feasible, and was further validated by the findings of a systematic review that adopted a ‘top-down’ approach. An intervention that makes every member of the general practice team more accountable for preventive health delivery to young children brings future possibilities for improving the health trajectories of our most vulnerable, a little closer.

Declaration

Thesis Chapt-er	Publication Title	Status	Nature and % of student contribution	Co-author names, Nature and % of Co-author's contribution	Co-authors Monash student Y/N
3	Parents' decision making and access to preventive healthcare for young children: applying Andersen's Model	Published	Conducted interviews and data analysis. Produced the first draft of the manuscript 65%	Brijnath B, co-supervised the study, conducted interviews and data analysis. Critically reviewed the manuscript, 25% Mazza D, conceived and co-supervised the study. Read and approved the final manuscript, 10%	N
3	Barriers and enablers to delivery of the Healthy Kids Check: an analysis informed by the Theoretical Domains Framework and COM-B model	Published	Conducted focus groups and data analysis. Produced the first draft of the manuscript 65%	Brijnath B, co-supervised the study, facilitated the focus groups and data analysis. Critically reviewed the manuscript, 20% Mazza D, conceived and co-supervised the study. Read and approved the final manuscript, 15%	N
3	'Can they really identify mental health problems at the age of three?' Parent and practitioner views about screening young children's social and emotional development.	Published	Conducted focus groups and data analysis. Produced the first draft of the manuscript 65%	Brijnath B, co-supervised the study, facilitated the focus groups and data analysis. Critically reviewed the manuscript, 20% Mazza D, conceived and co-supervised the study. Read and approved the final manuscript, 15%	N
5	The challenges of trying to increase preventive healthcare for children in general practice: results of a feasibility study	Published	Designed the intervention and conducted the study and analysed the data. Produced the first draft 75%	Brijnath B, Co-supervised the study. Critically reviewed and approved the manuscript, 12.5% Mazza D, Co-supervised the study. Critically reviewed and approved the manuscript, 12.5%	N

5	Identified health concerns and changes in management resulting from the Healthy Kids Check in two Queensland practices	Published	Conceived the article and produced the first draft 75%	Brijnath B, Critically reviewed and approved the article, 12.5% Mazza D, Critically reviewed and approved the article, 12.5%	N
5	Scrapping the Healthy Kids Check: a lost opportunity	Published	Conceived the article and produced the first draft 75%	Mazza D, Critically reviewed and approved the manuscript, 25%	N
6	Preventive healthcare for young children: a systematic review of interventions in primary care	Published	Co-conceived the study, analysed the data, produced first drafts of the review 75%	Brijnath B, Co-conceived the study and critically reviewed the manuscript, 7.5% Biezen R, analysed the data, 4.5% Hampton K, analysed the data, 3% Mazza D, Co-conceived the study, critically reviewed the manuscript, 10% All authors approved the manuscript	N

I have renumbered sections of submitted or published papers in order to generate a consistent presentation within the thesis.

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The undersigned hereby certify that the above declaration correctly reflects the nature and extent of the student's and co-authors' contributions to this work. In instances where I am not the responsible author I have consulted with the responsible author to agree on the respective contributions of the authors.

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Additional publications, presentations and awards

Conference presentations – Oral

July 2012 Primary Health Care Research Conference, Canberra

Parents' decision-making and access to preventive healthcare for young children: What Andersen's Model tells us

Karyn Alexander, Bianca Brijnath, Danielle Mazza

October 2012 GP 12 – The RACGP Conference for General Practice, Gold Coast

Social and emotional health checks for preschoolers. What GPs and Practice Nurses think and implications for practice

Karyn Alexander, Bianca Brijnath, Danielle Mazza

July 2013 Primary Health Care Research Conference, Sydney

Applying the Behaviour Change Wheel: Developing a theoretically grounded intervention to improve preventive health care for young children in general practice

Karyn Alexander, Bianca Brijnath, Danielle Mazza

March 2014 Research Translation Symposium, EPOC (Effective Practice and organisation of Care) Group, Melbourne

A case study from general practice 'An intervention to promote Healthy Kids Checks from general practice'

Karyn Alexander

July 2014 Primary Health Care Research Conference, Canberra

An intervention protocol to increase the uptake of Healthy Kids Checks in general practice

Karyn Alexander, Bianca Brijnath, Danielle Mazza

October 2014 GP14 – The RACGP Conference for General Practice, Adelaide

An intervention protocol to increase the uptake of Healthy Kids Checks in general practice

Karyn Alexander, Bianca Brijnath, Danielle Mazza.

June 2016 Primary Health Care Research Conference, Canberra

Small beginnings: A systematic review of interventions to improve the delivery of preventive healthcare for young children in general practice

Karyn Alexander, Bianca Brijnath, Ruby Biezen, Kerry Hampton, Danielle Mazza

Poster Presentations (Appendices 14 and 15)

July 2015 Primary Health Care Research Conference, Adelaide

Increasing the delivery of Healthy Kids Checks-a case study developing a complex intervention

Karyn Alexander, Bianca Brijnath, Danielle Mazza

Selected for Plenary session- brief presentation (Appendix 14)

July 2016 Society for Academic Primary Care Conference, Dublin

Small beginnings: A systematic review of interventions to improve the delivery of preventive healthcare for young children in general practice

Presented by Ruby Biezen

Karyn Alexander, Bianca Brijnath, Ruby Biezen, Kerry Hampton, Danielle Mazza (Appendix 15)

Awards

2009 and 2010 Primary Healthcare Evaluation and Research Fellowship Monash University

2010 Shepherd Foundation Grant

2010 Faculty of Medicine, Nursing & Health Sciences Monash University Strategic Grant

2011 RACGP Chris Silagy Research Scholarship

2013 RACGP Family Medical Care Education and Research Grant

2014 PHCRC Sponsored delegate

2014 Alexander KE, Brijnath B, Mazza D. Barriers and enablers to delivery of the Healthy Kids Check: an analysis informed by the Theoretical Domains Framework and COM-B model. *Implement Sci.* 2014;9:60-74.

(Highly commended by Health Services Research Association of Australia and New Zealand)

Acknowledgements

I would like to acknowledge the support of several funding agencies that enabled me to conduct this research:

1. The Shepherd Foundation, for financial support to conduct the qualitative research that forms the foundation of this thesis
2. The RACGP Foundation grants program for the Chris Silagy Research Scholarship that enabled me to pilot the intervention in general practice

I would also like to acknowledge my supervisors, Professor Danielle Mazza and Dr Bianca Brijnath. Thank-you for your intellectual insights, your guidance and support, and for the occasional push when my natural reserve got the better of me.

Many others contributed their time and effort, to bring this work to fruition: the parents, doctors and nurses who volunteered their knowledge and experiences for the primary research and Ms Anne Peek, CEO of South Eastern Medicare Local and her colleagues, including Ms Anne Nunan, for implementation of the pilot study, I am indebted to you all.

After seven years of pursuing this thesis whilst working as a general practitioner, I have many people to thank.

My husband, Mukesh, thank-you for your encouragement to begin and for taking charge of the additional burdens that inevitably came your way, and ‘our boys’, thank-you for your IT support and for your patience reading the first draft. My UK family, thank-you for listening.

My colleagues at Monash, thank-you for the community. My colleagues in general practice, my patients and my friends, thank-you for waiting.

This thesis is dedicated to my mother Evelyn, who was the first person to instil in me the significance of the early years.

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Abbreviations

AEDC	Australian Early Development Census
BCT	Behaviour Change Techniques
BCW	Behaviour Change Wheel
BMI	Body Mass Index
CALD	Culturally and linguistically diverse
CFHN	Child and Family Health Nurses
GP	General Practitioner
HKC	Healthy Kids Check
MCHN	Maternal Child Health Nurse
ML	Medicare Local
NSW	New South Wales
PEDS	Parents' Evaluation of Developmental Status
PN	Practice Nurse
QI	Quality Improvement
RCT	Randomised controlled trial
RACGP	Royal Australian College of General Practitioners
TDF	Theoretical Domains Framework

Chapter 1. Introduction and Overview

Jack's story

I called Jack in, noting he was booked for a double appointment.

'Mum' carried him in, held almost horizontally across her body, like a log, rigid. He looked heavy, but he seemed happy to be carried this way. His posture reminded me of another patient, Sarah. A girl I had known for many years before she'd died in her twenties from pneumonia. She had suffered from Cerebral Palsy.

As I introduced myself, 'Mum's' first question was, "Look, how much is this going to cost me because I've only got fifty dollars? My boyfriend gave me his card if it's going to cost more."

I tried to reassure her that we could work all that out later, to try not to let that worry her just now, 'Just tell me what's brought you here?' - I was already a bit suspicious. Something wasn't quite right here.

"He isn't sitting yet and he seems to be suffering some sort of separation anxiety because even if I leave him for a second he screams. You probably heard him out there (indicating the waiting room) when I went to the toilet, even though I left him with his aunt who's known him since he was born!"

I had. I had assumed, from the screams, it was just another child being vaccinated! I began to make a close inspection of Jack. His neck was extended and his gaze flicked predominantly to the right. His head looked too small for his 'toddler' body. He was holding and avidly chewing a rusk biscuit. His grip looked immature and he kept dropping the rusk. His mum retrieved it and repeatedly gave it back to him from the consulting room floor. Whenever she did so it looked like holding him was quite an effort, despite her youth. He *was* heavy. He looked content enough though. He was quiet and smiling.

I asked for some more information. As she spoke, I tried to retain some calm as I realised she didn't know.

He was 14 months old. She recalled his birth history. He'd been too slow on his heart beat recording and she had been induced two weeks early. The labour had been very quick – just over 3 hours – even quicker than her first, now aged three. He'd been born with the cord around his neck. There was also a story about a rash. "We all knew it was Staph. But they wouldn't admit it until much later."

Her main support was her grandmother and *she* had recently moved away. Her own mother was in jail. It was her aunt that had recommended me to her and had made the appointment on her behalf (a mother of two young boys, one of whom had recently had an Autism spectrum disorder confirmed). "I just know he should be sitting by now." Her other son, Tom, was walking by one. She was partnered, but not with Jack's dad. They lived in one of the newer housing estates in the outer suburbs. She said she hadn't bothered much with maternal and child health services but she had been to the doctors and they had reassured her, he would catch up. His primary vaccinations were up to date but she had missed one at 12 months.

In my head I tried to quell a rising sense of panic. 'Surely this couldn't happen, here, in 2013, in Melbourne?'

We took him over to the bed and she peeled clothes off his arched back, stiff extended legs and scrunched-up arms held tight across his chest. His mum stayed close to him as I confirmed a high tone in both legs (usually an indicator of brain damage), less pronounced in his arms. I pointed to some symmetrical bruising across the front of his thighs wondering if they were finger impressions.

'Mum' explained: Although he really was far too big for his baby walker, she had been forced to keep using it because it was the only way she could get any work done in her kitchen.

I could easily imagine how wedged in he would be. Jack was able to raise his head but it lagged as I pulled him to the sitting position. He clearly could not sit; he could not even roll over, a skill most babies achieved by four months. His eyes danced but he was able to see and hear. He loved animals, the family pets, and animals on the TV – he had watched an entire programme yesterday. He loved his brother. Pulses felt, heart sounds normal. No skin features. Head, small – 45.5 cm. He tolerated all of this without a sound, as long as mum stayed near. We got him up to try walking him – his legs held straight, his toes pointing. But nothing.

He also loved the water, she said, he was a real water baby. But he still wasn't sleeping through the night, he dribbled his bottle, and she had to prop him with his bottle at night. He has eight teeth (his mouth was identical to Sarah's, the girl with Cerebral Palsy – she'd ended up having all of her teeth pulled) and he drooled constantly.

How's your health Mum? I asked

She answered that she'd come off marijuana 3 weeks ago.

Why?

Because I thought I just should.

She looked alright. Twenty-five years old, simply dressed in a white T-shirt and jeans, clean. A mum's physique but she moved easily, still had some energy, didn't look depressed, and was responsive to her child.

I said she was right, he should be sitting by now. I reassured her that I was going to make some calls but she wasn't going to leave this surgery until we had the next step worked out.

She looked relieved.

I was quaking inside. A mixture of anger and disbelief. She was relieved because I had just listened to her and validated her concerns.

I asked her to sit outside to buy me some thinking time. I actually did not know where best to start. It was approaching four o'clock. I started to ring around; I left a message for the registrar on-call at the Royal Children's Hospital to ring me back. A nice receptionist at the Early Intervention Services offered, "You can put the child on a waiting list" – No, I needed to talk to someone. "I'll put you through to the Intake worker" – no reply, already gone for the day. Another message left. The local paediatrician was not in the Williamstown rooms today, try Melton, not there, try mobile, and leave a message. Sunshine hospital emergency department – by this time I'm definitely not thinking straight as I'd forgotten to request paediatrics. "I think you need paediatrics", said a kind Dr Jason. I explained my state of mind and how I was not going to let this mother go until we had some sort of action plan. He offered to find a paediatrician and ring me back.

I saw my next patient. I was distracted and an hour behind. At last, there was a call-back! It was from the registrar on-call at the 'Royal Children's Hospital. The registrar promises she will ring the mother tomorrow with an urgent appointment.

So we have the next step. The Mum and her aunt left, thanking me profusely. As I saw them out I urged her to keep her phone charged and on at all times tomorrow. I also reminded her that she would still need a GP. I felt I was sending her off on a journey and I hoped she could see it through.

Introduction

Children like Jack, born with severe disabilities, should be identified at birth. Failing this, Jack's developmental delays would become more obvious as time went on because an infant develops along a continuum, with head, neck, and body strength and movement (gross motor) the most recognisable of the developmental domains. An infant is presented to a general practitioner (GP) approximately 11 times in the first year (Goldfeld, Wright, & Oberklaid, 2003). Amongst these visits, Australia's immunisation programme schedules four separate time points in the first 12 months (when the child is well) for the primary vaccinations. Thus, there are many opportunities for an educated practitioner to cast an expert eye over a child, ask a few pertinent questions, and confirm that growth, health and development are all progressing normally.

Unfortunately Jack's story is not unique, but usually, when developmental delays are overlooked they are more subtle than his presentation. A child's natural developmental progression means that some deficits are only revealed as the challenges in life increase with age and appropriate milestones are not met. For example, a child with a speech deficit will usually present as delayed *after* the first year of life, despite the disorder having been present since birth, because spoken language normally develops during the second year. It may even have been noted that the child appeared to be a 'good baby' because he was so quiet. The child is, of course, dependent on the adults in his life, and therefore requires a problem to first of all be recognised by a carer, then acknowledged, and then presented to an (accessible and approachable) expert. From that point on, it is vital that the person consulted has sufficient knowledge and the authority to access specialist services for evaluation and diagnosis. A developmental delay, specifically, requires confirmation by a multi-disciplinary team before the child can be introduced to the physical and behavioural therapies that capitalise on the natural plasticity of the brain's architecture.

The recognition and remedying of child health, growth and development are not just vital for the individual child and family, but for economic reasons, to society as a whole. The long term benefits of high

quality early-childhood programmes that target disadvantaged families are estimated to provide an overall rate of return of 13.7 per cent per annum (García, Heckman, Leaf, & Prados, 2016). Through better outcomes in health, education, sociability and reduced crime, countries can expect large benefits in economic productivity when they invest in the early years (Belli, Bustreo, & Preker, 2005; García et al., 2016).

A census of children's health and development, completed by teachers in the child's first year at school, shows that currently more than a fifth of Australian children experience delays that significantly hamper their social, emotional, physical, communication and learning progress (Australian Government, 2016). In addition, preschool children experience high levels of chronic illness, particularly nasal allergies, asthma and eczema (Australian Institute of Health and Welfare, 2012) and even at such a young age are significantly impacted by lifestyle factors. Almost one quarter of children are overweight (Australian Bureau of Statistics, 2015) of which, 40 percent can be categorised as obese, as a consequence of environmental and genetic factors, dietary and physical activity inadequacies. Poor diet may be the single largest factor affecting infants and young children and contributes to the most common infectious disease of childhood, dental caries. Decayed, missing and filled teeth cause children to experience pain in large numbers (Chrisopoulos, Harford, & Ellershaw, 2016; Ha DH, Roberts-Thomson KF, Arrow P, Peres KG, & Do LG, 2016) and significantly impacts school attendance rates (Jackson, Vann, Kotch, Pahel, & Lee, 2011). These diseases are, at the very least, controllable and most are entirely preventable.

It was in this context of high levels of disease and disability with enormous potential for prevention, that the Australian government, in 2008, introduced the Healthy Kids Check (HKC) a health assessment aimed at children aged three to five years. The HKC was to be delivered by general practitioners (GPs), practice nurses (PNs) or registered Aboriginal health workers, and designed to coincide with pre-school vaccinations. It consisted of a review of the child's history, six mandatory assessments (height/weight, vision, hearing, oral health, allergies and toileting) and other non-mandatory components (Box 1). As stated by the Australian Government, the HKC provided an

opportunity to engage with families, detect problems early, promote a healthy lifestyle and offer appropriate early interventions (Department of Health, 2014). However, despite parent tax-incentives and Medicare (public insurance) rebates commensurate with the time taken to deliver services, less than half of eligible children went on to receive a HKC. Furthermore, there were large variations in delivery of the HKC across the states and territories (e.g. 22% in Victoria and 65% in Queensland) (Department of Human Services, 2015). I researched the variability in service provision/uptake (in a study prior to this PhD) to discover if this was due to socioeconomic differences, but could find no evidence of this. This quantitative analysis of HKC services, according to Divisions – the primary health organisations in place in 2010 – found that pre-schoolers received HKC services in proportion to their populations (of young children) but did not reveal the reasons behind the *state* variability (Alexander, Mazza, & Cowlishaw, 2010). Other factors must have accounted for the marked inter-state differences. In Queensland almost 83 per cent of childhood immunisations take place within general practice (in 2010), compared to 52 per cent in Victoria (National Health Performance Authority, 2010). It is possible that higher numbers of consultations for vaccinations presented more opportunities for HKCs. Additionally, Victoria's system of Maternal Child Health nursing services that provides routine child surveillance in local government centres outside of general practice, is more developed than in other states and could have conflicted with the provision of HKCs (Schmied et al., 2015).

Box 1. Components of the Healthy Kids Check (2008)

Mandatory	Non-mandatory
Height	Discuss eating habits
Weight	Discuss physical activity
Eyesight	Speech and language development
Hearing	Fine motor skills
Oral health	Gross motor skills
Question toilet habits	Behaviour and mood
Note Allergies	Other examinations as necessary

NB. The content of the HKC was reviewed in 2013 by a government appointed committee to include items from a validated (and publically available) social and emotional survey tool, the Pediatric Symptom Checklist (Jellinek 1998). Instructions stipulated that the questions were not to be used as a screening tool, but served to open up a conversation with parents about social, emotional or behavioural concerns. This revised-HKC was trialled in eight Medicare Locals but its evaluation was not published and consequently the HKC remained unchanged from the original version, until it was disbanded altogether in 2015.

Thesis aims and objectives

The reasons behind the variability in HKC provision remained unknown but my background work informed the development of my research question. This thesis therefore set out to:

- Investigate the reasons for the poor implementation of the HKC.
- Describe how child preventive health is viewed by GPs, PNs, and parents.
- Identify and pilot an intervention to increase HKCs in general practice.
- Implement an evidence based intervention to increase child preventive health in general practice, over the long term.

The overall aim of this research was to design an intervention that could override the barriers to preventive healthcare for young children (including the delivery of Healthy Kids Checks).

Overview and structure of thesis

Following a well-known methodology for the development of complex interventions proposed by the Medical Research Council (UK) (Craig et al., 2008) the basis of my PhD is as follows: to understand how the intervention might operate I identified appropriate theories and (due to a lack of research evidence) conducted investigative research with key participants i.e., parents (interviews) and GPs and PNs (focus groups) to establish how parents conceptualised preventive healthcare for their young children, what services they used, and the factors that influenced service uptake. I also sought to report on the experiences of practitioners (GPs and PNs) who offered preventive healthcare to pre-school children, including HKCs, to understand how and why some practitioners readily incorporated HKCs into routine general practice and others did not, and determine the barriers and enablers to preventive healthcare for pre-school children. The findings from these studies were mapped to a behavioural change model to formulate preliminary recommendations for an intervention. These were presented to a local stakeholder group to receive additional input and gain consensus for the design of the intervention. The specific ingredients of the intervention were decided using a suite of interventions and Behaviour Change Techniques provided in a novel evidence-based guide that utilised the Behaviour Change Wheel (Michie, Atkins, & West, 2014) and this was piloted in three general practices to test its feasibility. In a final step, a systematic review was conducted to examine how my theoretically derived intervention compared with other primary care interventions, and whether I had missed any important components. The plan to scale the intervention, in the context of Medicare-supported HKCs, and test it outside of Victoria was initially thwarted by the removal of the HKC from the Medicare schedule in 2015. However, the fact that children continue to suffer high rates of preventable health conditions and remained developmentally at risk makes the intervention ever-more important, and I am poised to begin a cluster randomised controlled trial of a child-preventive health intervention based on the findings presented in this thesis, in 2018.

This thesis includes the manuscripts undertaken as part of my doctorate, all of which are published. Consequently, the background section within each manuscript repeats some of the information about

HKCs and the state of play regarding children's preventive healthcare, tailored to each topic as it is presented. Additionally, as multiple methods were used and are discussed within the published manuscripts, I have neither detailed them in a methods chapter nor in the lead up to the presentation of each manuscript. Rather, where relevant, I highlight methodological challenges and lessons learned from deploying particular techniques within the parameters of my study topic, populations, and settings. The timelines of the study and outlines of each chapter are presented in Figure 1 and below.

Chapter 2 provides an overview of the literature and begins by describing the types of problems that can be considered under the heading of "preventive health", their prevalence and what can be done to intervene. The underlying reasons for intervening early and the intersection with government policy are also discussed. The role of the GP and delivery of preventive health care, before HKCs were introduced, is detailed and leads into the purpose of HKCs. This uncovers and delineates the gap my thesis aimed to address, the topic of 'Implementation research' and what is already known about the barriers to preventive healthcare for young children and previous interventions.

Chapter 3 begins with my experience and 'reflexivity' as a GP-researcher then presents the qualitative foundational research in three parts. Beginning with the parent study, I introduce the theory behind the study, the participants, recruitment and results. The published paper, "Parents' decision making and access to preventive healthcare for young children: applying Andersen's Model", is followed by a comparison with a parallel research study. The practitioner study is similarly introduced with its methodology, the publication, "Barriers and enablers to delivery of the Healthy Kids Check: an analysis informed by the Theoretical Domains Framework and COM-B model", and a discussion of the lessons learned. A third publication, "'Can they really identify mental health problems at the age of three?' Parent and practitioner views about screening young children's social and emotional development", drawn from a combined analysis of both parents and practitioners, is followed by a discussion regarding the controversial topic of mental health screening in young children.

Chapter 4 describes the advances I made on the design of the intervention, and is presented in three stages. First, I report the input obtained from a stakeholder group and how the barriers uncovered in

the qualitative studies are mapped to aspects of the intervention. In the second stage, I recount how I determined the components and mode of delivery of the intervention, whilst the third stage encompassed the methods I envisaged would be used to collect the data.

Chapter 5 details in the publication, “The challenges of trying to increase preventive healthcare for children in general practice: results of a feasibility study”, how the intervention was piloted in three general practices and the lessons learned from this study. This feeds into another publication, “Identified health concerns and changes in management resulting from the Healthy Kids Check in two Queensland practices” and reflects the commentary I made in response to others’ research into the outcomes of HKCs, which I saw as an important motivator for practitioners to complete HKCs. A third publication, “Scrapping the Healthy Kids Check: a lost opportunity” is an opinion piece that arose following the announcement that funding for HKCs was to be withdrawn, and this concludes the chapter.

Chapter 6 presents a systematic review of preventive healthcare for young children, which I began before the ‘demise’ of the HKC. The publication, “Preventive healthcare for young children: a systematic review of interventions in primary care”, is extended to encompass an analysis of the interventions according to the Behaviour Change Wheel framework I adopted.

In the final chapter I summarise the key findings from my PhD and integrate this with a discussion about alternative primary care research that has utilised the same theoretical framework, and potential future studies in preventive healthcare for young children. I conclude by outlining the future direction my research programme will take and its likely effect on practice and for children.

Figure 1 depicts how the timelines of the study intersected with policies directed at delivery and uptake of the HKC and the changes made to the structure of primary care organisations. Primary care organisations are held responsible for addressing some of the primary health care needs of local populations, and liaise with private general practice. In my research they helped with participant recruitment, contributed to the formulation of the intervention and supported its roll-out. The various organisations are referenced throughout this thesis.

YEAR	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
PROJECT timelines			Ethics and lit review	QUAL Research with Parents and Practitioners		Stakeholder meeting	Pilot study in three general practices	Systematic review Intervention ready to upscale to cluster RCT		
HKC-related Timelines	July-HKC introduced		Medicare Benefits Schedule aligns HKC to Health Assessment items	HKC Linked to Family Tax Benefit	Govt. announce Expanded-HKC to include social/em health assessment	Evaluation of Expanded-HKC (not published)		HKC removed from Medicare schedule November 2015		
Primary Care Organisations (*contributed to the conduct of this research)	1992 > 108 GP Divisions* Largely funded by the Australian Government as primary healthcare reforms were instigated, Divisions supported GPs with changing requirements, including continuing medical education and shared-care hospital programs (Harris M, Zwar N 2014). In 2011, the 108 Divisions enjoyed high participation from GPs. They connected GPs for the first time and enabled services (including HKCs) to be regionally mapped			61 Medicare Locals* In 2010, after the release of the Australian Government's first National Primary Health Care Strategy, Divisions were disbanded. To form Sixty-one regional primary care organisations called “Medicare Locals”. Medicare Locals were tasked with integrating a broader range of primary care practitioners to liaise with hospitals and manage prevention programs and increasing burdens of chronic disease			31 Primary Health Networks In 2015 Medicare Locals were replaced by regional “Primary Health Networks”, with boundaries closely aligned to those of Local Hospital Networks (some cover an entire state/territory). They have two ‘overarching objectives’ - medical service ‘efficiency and effectiveness’ and coordination of care in six priority health areas: Aboriginal health, aged care, e-health, mental health, population health and health work-force (Booth et al. 2016)			

Figure 1. Timelines of Project, HKC and Primary care organisations

Chapter 2. Background

Significant health, developmental, and behavioural problems exist in young children

Extensive research demonstrates that the foundations of lifelong health are laid down in early childhood (Center on the Developing Child at Harvard University, 2014). Supported by sound nutrition and nontoxic environments, nurturing relationships help infants and young children develop well-regulated stress response systems and the capacity to learn (Center on the Developing Child at Harvard University, 2010). Where deviations occur, the period of early childhood represents a critical window of opportunity, where high quality health and educational interventions can reap benefits that extend across the life-course (Belli et al., 2005; Sweeny, 2014). By capitalising on brain plasticity and changing developmental trajectories, investments in the early years can have substantive and important benefits to personal health and educational opportunities, employment and wealth, benefiting the child, the family and, ultimately, the economy and society in general (Jamison et al., 2013). The preschool period provides an opportunity to identify and remediate early childhood disadvantage, since close to one in four children remain developmentally vulnerable as they start school (Australian Government, 2016). They score poorly ($< 10^{\text{th}}$ percentile) in health, social competence, emotional maturity, language, cognition and communication, all of which are important predictors of adult health, education and social outcomes. Australian preschool children also have high rates of overweight or obesity (23 per cent) (Wake et al., 2007), suffer dental disease (47.7 per cent) (Chrisopoulos et al., 2016) and behavioural and mental health problems (14 per cent) (Lawrence et al., 2016). These figures are similar to prevalence rates reported in other high-income countries. For example, in the United States (US), 15-18 per cent of children have developmental disabilities (Glascoe, 2000a; Newacheck & Halfon, 1998), and 21.6 per cent children have special healthcare needs (Houtrow, Kim, Chen, & Newacheck, 2007; Newacheck & Halfon, 1998). In the United Kingdom 17 per cent of children (aged seven) are reported to have special needs, (Parsons & Platt, 2013) and 7.3 per cent are defined 'disabled' (Blackburn, Spencer, & Read, 2010). Prevalence rates

are higher for black and minority groups, boys, and children from low-income and single-parent households (Blackburn et al. 2010; Newacheck & Halfon, 1998). Children with higher healthcare needs miss three times as many days of school as other children (Jackson et al., 2011; Newacheck & Halfon, 1998), particularly when disability impairs their capacity for learning, age-appropriate activities and social connectedness, and may perpetuate cycles of social disadvantage (Blackburn et al. 2010).

Types of developmental problems

In countries like Australia, severe developmental problems, particularly when they are associated with dysmorphias (abnormal facial characteristics and physical abnormalities), are usually detected at birth. However, more subtle developmental problems are more likely to be overlooked (Aylward, 2009; Hamilton, 2006). For example, the majority of children diagnosed before 3 years with an Autism Spectrum Disorder (ASD) are not recognised by their parents as having a disability (Bellman & Vijeratnam, 2012; Perera, Vijeratnam, & Bolland, 2007). The average age of diagnosis of ASD in Australia is 4 years 1 month (5.9 years is the most frequent age of diagnosis) (Bent, Dissanayake, & Barbaro, 2015) a figure in keeping with international studies that demonstrate an average age of diagnosis between 3.1 and 5.7 years (Mandell, Novak, & Zubritsky, 2005; Shattuck et al., 2009). In the US, despite more than a decade of professional guidelines, infants and children are not always identified in a timely manner (American Academy of Pediatrics-Committee on Children With Disabilities, 2001; Glascoe, 2005). Language delays are picked up later than motor delays, and younger children and infants with developmental problems are under-identified compared to older children (Hix-Small, Marks, Squires, & Nickel, 2007; Sices, Feudtner, McLaughlin, Drotar, & Williams, 2004). However, multiple domains, communication delays and gross motor delays, are more likely to be detected by parents and referred by clinicians (Earls, Andrews, & Hay, 2009).

What is Developmental Surveillance?

Health checks and assessments that attempt to document child development on a single occasion risk both missing children with delays (false negatives) and categorising children as delayed when they are

developing normally (false positives). To counter this, a series of visits is proposed, termed “Developmental Surveillance”:

“a flexible, continuous process whereby knowledgeable professionals perform skilled observations of children during the provision of health care” (Dworkin, 1993)

The concept of child development has, over recent years, expanded to encompass social, behavioural, and emotional development, domains that are important for success in school and relations with others. All Australian states and territories provide universal Child and Family Health Nursing (CFHN) services to families with young children. Although free at the point of service, levels of care vary between and within jurisdictions (Schmied et al., 2015). Women are referred by midwives from maternity services in hospital, and a schedule of routine monitoring of child development, parenting support, and health promotion is generally offered until the child is five years-old. In Victoria, where this research was conducted, CFHNs are called ‘Maternal Child Health Nurses’ (MCHNs). MCHNs provide ten “Key Ages and Stages” visits to age five years, offer support to children up to eight years, and ‘enhanced’ services to families at risk. CFHN services have been criticised for poor communication, information transfer and coordination of care with GPs that risks the health of young children (Psaila, Schmied, Fowler, & Kruske, 2014; Schmied et al., 2015) with services “organised around the requirements of health professionals rather than the needs of women and families” (Psaila et al., 2014). Paediatricians, in Australia, provide a specialised secondary consulting service for health and developmental problems and whilst MCHNs can refer children directly, the national insurance scheme, Medicare, does not reimburse care without a GP referral (Kuo et al., 2009).

In the US, where paediatricians assume a prime role in all aspects of child health (Kuo et al., 2009) the American Academy of Pediatrics has issued guidance regarding developmental surveillance since 2001 and advocates the use of validated developmental screening tools at nine, 18 and 30 months and when otherwise indicated (Duby, 2006). These ‘Well Child Care’ visits are the most common services delivered by primary care paediatricians in the US (also delivered by Family Physicians) (Duby, 2006) where screening and health promotion services are encouraged, rebated and, in some

circumstances, mandated (Kuhlthau et al., 2011). Preventive health and developmental services in the US have been driven by national surveys, beginning with the Commonwealth Fund Survey in 1996 (Young, Davis, Schoen, & Parker, 1998) and continued through ‘The National Survey of Early Childhood Health’ (Blumberg, Halfon, & Olson, 2004), conducted approximately every four years since 2003. Using a telephone survey methodology, the survey obtains parents’ perspectives on their access to quality healthcare, including screening and health practices in the context of the child’s family and neighbourhood (Blumberg et al., 2004).

Prevalence of Preventable Health Disorders

As a suite of examinations and assessments, the HKC attempts to identify conditions that occur at high prevalence rates in young children, including dental caries (decay), overweight, social-emotional (mental health) and behavioural problems. These will be discussed in more detail below.

Dental caries

Dental caries (decay), as the most common chronic infectious disease of childhood. According to national surveys it occurs in at least 1 in 4, and possibly, 1 in 2 children aged five years in Australia (in their deciduous, or ‘milk,’ teeth) (Chrisopoulos et al., 2016; Ha DH et al., 2016). For children aged 5-6 years, higher rates of untreated dental caries exist amongst Indigenous children (approximately 1.8 times compared to non-Indigenous) and amongst children whose parents were born overseas (approximately 1.4 times the rate of Australian-born parents), educated to school level (approximately twice the rate of tertiary educated parents), in low-income households (approximately 2.5 times the rate of high income households) and living in remote or very remote locations (approximately 1.7 times the rate of major city locations) (Ha DH et al., 2016). Twenty per cent of children (aged 5-10 years) experience *extensive* dental caries, where more than three quarters of tooth surfaces are affected by dental caries (Spencer AJ & Do LG, 2016). Despite recommendations for cleaning children’s teeth from the time they erupt, using fluoridated toothpaste from 18 months, more than a quarter of parents do not begin their children’s dental hygiene until after the age of 30 months and more than half do not brush twice a day (Do LG & Spencer AJ, 2016). More than one-fifth of children report irregular

dental visits, most of which are to private dental services (over 56 per cent) (Do LG & Spencer AJ, 2016). Large consumptions of sugar containing snacks and beverages, and trends towards children drinking fluorine-filtered or bottled water, further risk the dental health of young children (Spencer AJ & Do LG, 2016).

Overweight

Despite a reduction in the rapid *rise* of childhood obesity world-wide, in Australia around one in four children aged 2-14 years remain overweight or obese (17.3 per cent overweight, 7.3 per cent obese in 2014-15) (Australian Bureau of Statistics, 2015) and prevalence in preschool boys may still be rising (Australian Bureau of Statistics, 2015; Hardy, King, Espinel, Cosgrove, & Bauman, 2011). Overweight and obesity in childhood are more likely to track through adolescence into adulthood and increase the risk of developing chronic diseases like diabetes and heart disease. Low consumption rates of fruit (68.1 per cent of children meet guideline recommendations) and vegetables (only 5.4 per cent of children meet the guidelines) (Australian Bureau of Statistics, 2015) and inadequate rates of physical exercise (Epidemiology Branch, Population Health Division, & Health Directorate, 2012; Hardy et al., 2011) are thought to contribute, along with epigenetic, genetic and environmental factors (Herrera, Keildson, & Lindgren, 2011; Pigeure, Yazdi, Kaur, & Meyre, 2016). Despite childhood overweight representing a significant public health issue, GPs have pin-pointed a lack of resources in the health system and few referral options in the community, as being significant barriers to identifying and managing overweight (McMeniman, Moore, Yelland, & McClure, 2011).

Social and emotional health

Two national surveys have produced estimates of the prevalence of behavioural and mental health disorders in Australian children (Lawrence et al., 2016; Sawyer et al., 2001). Approximately fourteen per cent of children aged 4-17 years suffer from a mental disorder (e.g. attention-deficit-hyperactivity disorder (ADHD), depression, and anxiety disorders) a figure in keeping with the international literature (World Health Organisation, 2017). In children aged 4-11 years the prevalence of any mental disorder was higher for boys than girls (16.5 per cent versus 10.6 per cent) with higher rates of

anxiety, ADHD and conduct disorders (Lawrence et al., 2015). More children of step-, blended- or one parent-families suffered mental illness compared to children living in 'original' families, and was highest amongst children of families in the lowest income bracket (Lawrence et al., 2015).

Developmental delay and a measure, the Australian Early Development Census

Since 2009, tracking of children's health in Australia, has been obtained in cross-sectional surveys of children as they begin school (Australian Government, 2016): The Australian Early Development Census (AEDC) is a nationwide census completed by teachers on behalf of 99 per cent of schoolchildren, during their first year at school. It provides an opportunity to follow cohorts of young children, to inform the development of policies and programmes and help evaluate long-term strategies aimed at improving early childhood development. One hundred items that assess five domains of development are completed for each child. The five domains considered important to make a successful transition into full-time learning, and predictive of success through school and into adulthood, comprise: Physical health and wellbeing, Social competence, Emotional maturity, Language and cognitive skills (school-based) and Communication skills and general knowledge.

Based on cut-offs established in the first 'census', children who score in the lowest quartile for any domain of development are classified as 'developmentally-at risk' (10th -25th percentile) or 'developmentally-vulnerable' (10th percentile or less). Currently, in Australia, 22 per cent of children are classified as developmentally vulnerable in a single domain, whilst 11.1 per cent are developmentally vulnerable in two or more domains of development (Australian Government, 2016). This 'snapshot' of child development reveals the links between preschool attendance and educational outcomes in the first year of school and enables governments, at all levels, to resource communities according to need. For example, a mapping exercise found that only 11 per cent of communities with high proportions of children developmentally at risk/vulnerable in language skills, had access to speech pathology services. These communities could benefit from a population based intervention that locates additional services according to need (McCormack & Verdon, 2015). Australia is, therefore, well placed to track rates of developmental delay amongst young children.

It is essential that, having identified problems, knowledge is translated into action. However, this raises another fundamental issue: what can be done to improve the health and development of young children and when should this begin?

Early Intervention – Origins and Evidence

“The first three years provide a foundation for all subsequent development” (Shore, 1997)

The interplay between ‘Nature and Nurture’ in the developing brain provides a window of opportunity to intervene and provide additional support, to potentially change developmental trajectories and break down cycles of intergenerational disadvantage. There is considerable debate about how ‘Early Intervention’ should be considered. Interventions originally conceived in a framework of ‘service provision’ (Shonkoff & Meisels, 2000) have shifted to become more ‘process-oriented,’ whereby the *natural* (family) environments that children inhabit become the focus of change (Dunst, 2000, 2002) rather than the child’s *learning* environment. This differentiation is crucial to the focus of policy, resource allocation, and treatment where *“Good early intervention services see the child as a child first, as part of a whole family, and not just a child with a disability”* (Raising Children Network, 2016).

Much of the evidence for early intervention is derived from core studies in two streams of research: educational interventions and studies with preterm babies. The significance of these ground-breaking studies warrants more detail.

Landmark studies from early education

The Perry Preschool program (a randomised trial) aimed to find out if preschool education could mitigate the social disadvantages conferred by children with borderline IQ living in low socio-economic circumstances (Schweinhart et al., 2005). It randomly assigned 58 of 123 ‘at risk children’ to high quality preschool education, and families were encouraged to provide experiences that promoted their child’s development (the remaining 65 pre-schoolers received no program). Short term gains in IQ scores translated into improvements across the life-course, including significantly higher weekly earnings for participants. The success of the intervention has shown a significant net gain to

society accrued from reduced special education needs, decreased juvenile and criminal justice expenditure, reduced welfare dependence and increased tax revenues from higher incomes (Schweinhart et al., 2005).

A second study, the Abecedarian Project (a randomised controlled trial (RCT)) also examined whether high-risk children could benefit long-term from early education (Campbell et al., 2012). Participants were enrolled into full-day child-care to the age of five years and, in the early years of their child's schooling, parents were encouraged to become involved. Enrolled children were four times more likely to have graduated from college by 30 years of age although findings were mixed regarding evidence for economic benefits (Campbell et al., 2012).

Subsequent studies with preterm babies

Developmental interventions in preterm infants that adopted a traditional, therapist based approach following hospital discharge, have produced short-term cognitive and physical benefits that were not sustained at school age (Orton, Spittle, Doyle, Anderson, & Boyd, 2009; Vanderveen, Bassler, Robertson, & Kirpalani, 2009). However, more recently, screening and neurosensory rehabilitation, thought to capitalise on the maximal brain plasticity present during the early years, have produced benefits in hearing, visual and motor impairments of children with cerebral palsy (Maitre, 2015). Significant challenges remain, particularly with the rehabilitation of more complex functions, cognition, communication and behaviour.

Studies with young children

More recently this evidence has been extrapolated into health and developmental gains for young children. A contemporary review of early interventions for children suffering from Autism has shown that with significant time and financial investments, positive benefits in language, cognition and 'joint attention' (e.g. pointing to share information) can be accomplished (McPheeters et al., 2016). However, where long term outcomes were evaluated, considerable variability was demonstrated (McPheeters et al., 2016). Results from a RCT with parents of children

with Autism have been more encouraging and demonstrated sustained improvements in autism symptoms and social communication following a preschool intervention (Pickles et al., 2016). The study recommended replication by others and further research to illuminate the developmental mechanisms behind the change, as well as an economic analysis (Pickles et al., 2016).

The Economic Argument for Early Intervention

The ethical rationale for early intervention- that all children should be able to reach their full potential, and the child development rationale- that society should fully develop the skills and abilities of all children, are at times, overshadowed by economic arguments for a ‘return of investment’(KPMG, 2011). Prompted by the 20th anniversary of the World Development Report, in 2013, a report from a *Lancet* Commission re-considered the case for future investment in health (Jamison et al., 2013). It concluded that, given the right investments, dramatic gains could be achieved by eliminating health disparities and averting more than ten million deaths across low and middle income countries, *“practically ending preventable child and maternal death in a generation”* (Jamison et al., 2013).

Economic benefits are also evident from studies in high income countries but need to include long-term evaluations to more accurately measure cost-effectiveness (McGroder & Hyra, 2009). This review included a ‘Nurse-Family Partnership’ randomised trial, with teenage mothers in intervention families, taught parenting skills during nurse home visits and encouraged to pay attention to their infants’ emotional needs (Olds et al.1997). It found that by the time these children reached 15 years of age, estimated benefits represented five times the cost of providing the programme for higher risk families (McGroder & Hyra, 2009). In Australia, favourable cost benefit ratios have been calculated from three childhood intervention programs: “The Communities for Children” programme, which targeted the physical and mental health of children, their families and local communities (377 per cent return); “The Positive Parenting Program” that worked with parents to improve parent competency (1,283 per cent return) and the “The Reconnect Program” that promoted school bonding and relationship-conflict resolution for older children (81 per cent return) (Sweeny, 2014). For these programmes to work, requires long term investment and supportive policies across all government sectors.

Early Intervention and Policy

Strong evidence emerged from an additional seminal study in 1998 (Felitti et al., 1998;): The Adverse Childhood Experiences (ACE) Study, a retrospective study of more than 13,000 adults who had completed a standardised medical examination, demonstrated associations between reported childhood maltreatment and health later in life. The role of epigenetics- how a person's genome is modified by the early environment (in the womb and beyond) to induce non-communicable (chronic) diseases- elucidates the underlying mechanisms in the ACE study. Toxic stress and poverty confer a double disadvantage for health and one that is perpetuated across generations (Goldfeld et al., 2003; Shonkoff, Boyce, & McEwen, 2009). Consequently, a number of policy frameworks, established in the 2000s, began to take a combined approach and targeted the foundations to poor health, poverty and inequity (Table 1). The National Early Childhood Development Strategy, established in 2009, outlined the role of communities, non-government organisations and all governments to respond to the needs of children and families (Council of Australian Governments, 2009). The National Framework for Universal Child and Family Health Services (Department of Health, 2011), closely aligned to this strategy, planned for quality services across all states and territories to encompass antenatal, postnatal and child services through to aged eight years to be delivered by CFHNs. Their key function was to *“monitor child health, development and wellbeing, identify early disability and delay or health issues (both physical and socioemotional) and support the developing parent and infant (young child) relationship”* (Department of Health, 2011). Collaboration and continuity of care between primary, secondary and tertiary health services, as well as education, welfare and disability sectors, to provide ‘seamless’ transition points, were other major objectives.

GPs, on the other hand, were acknowledged as an important component of *opportunistic* contact with young children in ‘The National Framework’, particularly around episodic illness and immunisation services (Department of Health, 2011). GPs were directed to *“discuss any other relevant information at this contact or encourage participation in the universal service where this is beyond their scope of practice”*. One of the key performance indicators established in this document was the proportion of children who received a health check prior to school entry (from either general practice or CFHN).

This statement, along with the establishment of Medicare-supported HKCs in 2008, provided the impetus for general practice to adopt a prime role delivering preventive healthcare to young children

Table 1. Relevant National Australian Government policy frameworks established from 2009

Policy	Date	Objective
<i>The National Partnership Agreement on Preventive Health</i>	2009-2015 (cut prematurely in 2014)	Takes a community approach to address lifestyle risks to chronic diseases- smoking, nutrition, alcohol and physical activity. One aspect focuses on children to encourage higher levels of physical activity and fruit and vegetable intake in childcare, preschool and school settings. Also promotes a healthy start to life through positive parenting and supportive communities
<i>The National Early Childhood Development Strategy, Investing in the Early Years</i>	2009	Aims to achieve positive early child development, the reduction of risk factors, improve life-transitions, health and wellbeing. This strategy partners with other policy initiatives and represents the broad ‘umbrella’ for a shared state and national government agenda. It was endorsed in 2009 and aims to produce a collaborative effort between all tiers of Australian government. It encompasses the two partnership agreements below
<i>National Partnership Agreement on Early Childhood Education</i>	2009-2013	To deliver preschool education to all children by 2013
<i>National Partnership Agreement on Indigenous Early Childhood Development</i>	2009-2014	Supported the “Closing the Gap” targets for indigenous health
<i>National Disability Agreement</i>	2009-	National agreed objectives for people with disability. A high level agreement between the states and territories to provide services to people with disability with centralised funding of all disability payments through the National Disability Insurance Scheme
<i>National Framework for Protecting Australia’s Children</i>	2009-2020	Strives to improve child and family safety by reducing child neglect and abuse
<i>The Australian National Breastfeeding Strategy</i>	2010-2015 (funding in place to 2019)	Aims to improve the health, nutrition and wellbeing of infants and young children (and their mothers) through the promotion and support of breastfeeding. It includes education and training of health professionals
<i>National Plan to Reduce Violence against Women and their Children</i>	2010-2022	Aims to improve child and family safety by focusing on domestic and family violence
<i>National Framework for Universal Child and Family Health Services</i>	2011	Articulates a vision for universal child and family health services for all children from 0-8 years

<i>National Quality Agenda for Early Childhood Education and Care</i>	2012-	Established a national agenda for the quality of early childhood education and care
<i>Healthy, Safe and Thriving: National Strategic Framework for Child and Youth Health.</i>	2015	Identifies key strategic priorities and establishes a national vision for child and youth health for the next 10 years (following cessation of a number of National Partnership Agreements)
<i>The Strengthening Immunisation Requirement</i>	2016	Vaccination “conscientious” objections are no longer accepted for a family to continue to receive child care and tax benefit subsidies

General Practitioners' role providing preventive healthcare for young children

GPs play a critical role in the provision of child healthcare in Australia. Parents engage with GPs from the birth of their child (Goldfeld et al., 2003) and approximately 92 per cent visit a GP with their child each year (Centre for Epidemiology and Evidence, 2012). These consultations are an opportunity for better engaging with children and families to provide preventive care, early detection of disabilities, and intervention. This is especially important because parents place a high value on the guidance they receive from medical practitioners regarding the health and development of their children, including parenting skills (Radecki, Olson, Frintner, Tanner, & Stein, 2009). In terms of financial considerations, Australian general practice operates from predominantly privately owned clinics with rebates for services – inclusive of the HKC – available from the national insurer 'Medicare' (Agency for Clinical Innovation 2015).

Prevention for Children – The Role of the GP in the Health System

The importance of professional groups having defined roles and explicit criteria for referral is crucial to maintain coordinated care. The Australian system runs the risk of fragmenting preventive healthcare for children, as each 'specialty' – GPs, CFHNs and paediatricians – divide responsibility and work from different settings (Kuo 2009). To compound matters, the services delivered by Australia's CFHNs vary across states and territories so that significant barriers to uniform implementation remain (Schmied et al., 2015).

Internationally, the optimal design of a system of child health prevention and promotion has not been formulated and is compounded by a lack of knowledge of the relationship between services and children's health outcomes (Wood & Blair, 2014). In the US, the responsibility of both acute and preventive child healthcare resides with a single primary care provider, a paediatrician or family physician, who provides a whole series of recommended "Well Child Care" services (Kuo et al., 2006). Efforts at coordinating paediatric care within a single "Medical Home" have improved the integration of care for children in the US (Kuo et al., 2009) but have placed a considerable burden of

care upon physicians. Amongst developed countries, this model is the exception, rather than the rule. Like Australia, Denmark, England, The Netherlands and Sweden, all place responsibility for some child preventive developmental services with community-based nurses. In Germany and Spain, GPs share the care and in France and Japan both GPs and community nurses are involved independently (Kuo et al., 2006).

Another concern resulting from fragmented care, is that of potentially de-skilling the general practice workforce with respect to paediatric healthcare (Freed, Sewell, & Spike, 2011; Hall, 2004). GPs who believe that screening and surveillance should be conducted by CFHN services are less likely to be involved in child health-promotion activities (Waters, Haby, Wake, & Salmon, 2000). In addition, as the focus of health has moved towards adult, non-communicable diseases that dominate an aging population, some authors claim that the proportion of GP consultations devoted to children has declined (Freed et al., 2011; Freed et al., 2013). Prior to 2008, management of childhood overweight represented only two per cent of consultations, despite a prevalence of approximately 20 per cent (Cretikos, Valenti, Britt, & Baur, 2008) and national guidelines that recommended growth monitoring every three months (National Health and Medical Research Council, 2013). This serves as one example of the low priority that denotes child- preventive healthcare.

The Healthy Kids Check

The Medicare rebate assigned to a HKC service altered over the years to incentivise participation in the scheme, but important differences set it apart from routine ‘sick-child’ medical services. Like conventional services, the HKC-item was time based, but, unlike these services, it incorporated input from the PN (or Aboriginal Health Worker). This meant that GPs could effectively ‘sign off’ on an examination performed by a PN, and claim the higher-rebated health assessment items according to the Medicare Benefits Schedule (Table 2).

The HKC was deliberately timed to be delivered in conjunction with preschool immunisations [administered in local government clinics or GP-surgeries with 93 per cent coverage across Australia (Department of Health, 2017a)] when the child is clinically well. The preschool period also represents

a key ‘transition point,’ a significant juncture in the life-course that resonates with parents as they prepare their children for school, making them more receptive to advice and amenable to change (McAllister, Wilson, Green, & Baldwin, 2005; Puccioni, 2015).

While there was concern regarding the individual elements of a one-off health-check to produce measurable outcomes (Alexander & Mazza, 2010b), the authors of a seminal review of child health screening and surveillance (Oberklaid, Wake, Harris, Hesketh, & Wright, 2002) acknowledged that prevention and health promotion should be regarded as an integral component of a high quality primary healthcare. Further, “*activities that lead to identification of risk – eliciting parent concerns, physical examination, informal observations, obtaining information from other sources, measurement of growth, administration of tests and procedures, referral for further assessment....should be pursued on an individual and population basis*”. The review also encouraged further research to establish the efficacy and effectiveness of various strategies (Oberklaid et al., 2002).

Table 2. Health Assessment item numbers as per Medicare Schedule 2014-2017 (included Healthy Kids Check to November 2015)

Item	Number	Time	Health Assessment Rebate (\$)	Standard consultation Rebates*(\$)
Brief Health Assessment	701	< 30 mins	59.35	< 20 mins 37.05
Standard Health Assessment	703	31 to < 45 mins	137.90	> 20 mins 71.70
Long Health Assessment	705	45 to < 60 mins	190.30	> 40 mins 105.55
Prolonged Health Assessment	707	60 or more mins	268.80	
Bulk Billed item	10990	n/a	6.15	
Nurse /Aboriginal Health Worker- HKC	10986	n/a	59.35	

*Practice Nurse contribution towards consultation length **not** permitted

Concerns about the evidence behind the HKC

The reasons behind the choice of the specific components of a HKC were never elucidated but did not appear to be evidence based (Box 2) (Alexander & Mazza, 2010b). A study of HKC items (administered at four years of age) as predictors of health problems at seven years of age, showed only two items were moderately predictive of future adverse health – overweight/obesity and mental health (Smithers, Chittleborough, Stocks, Sawyer, & Lynch, 2014). The rest were poor predictors of other health and academic outcomes. Despite these constraints, the argument was made in support of HKCs because the problems identified by the HKC would not generally be detected during standard consultations with GPs (due to time limitations) (Smithers et al., 2014). These concerns were echoed in the GP community and may have impacted on take-up by GPs.

Box 2. Formulation and Dissemination of ‘Evidence Informed’ Healthy Kids Checks

A review of the evidence behind The Healthy Kids Check (Alexander & Mazza, 2010b) (Appendix 1)

Objective: To assess whether the components of the Healthy Kids Check were supported by evidence-based guidelines or reviews.

Data sources: Guideline and MEDLINE databases were searched for guidelines and systematic reviews published between 2000 and 2008 that were relevant to screening, prevention or ‘Well Child Care’ in primary healthcare, inclusive of preschool-aged children.

Study selection: 34 relevant guidelines or reviews were retrieved.

Data extraction: For each component of the HKC, guidelines were reviewed that addressed the rationale for screening, or the test or tool required to implement it. Relevant guidelines were assessed as to whether they supported or opposed components of the HKC, or stated that the evidence was insufficient to recommend screening.

Data synthesis: Guidelines were often inconsistent in their recommendations. Most of the components of the HKC (eg, screening for chronic otitis media and questioning about toilet habits) were not supported by evidence-based guidelines relevant to the primary care setting, though a number of consensus-based guidelines were supportive.

Conclusions: There was a dearth of evidence relevant to child health surveillance in primary care. The components of the HKC could be refined to better reflect the evidence.

Formulation of an “Evidence-Informed” Healthy Kids Check (Alexander & Mazza, 2010a) (Appendix 2)

Objective: This publication proposed a series of evidence based examinations that fulfilled the mandatory requirements for a Healthy Kids Check, tailored to the general practice environment. Consideration was also given to the non-mandatory HKC-examinations and additional assessments that had some evidence for their application.

Discussion: The proposed examination added confidence and rigour to the GP-led HKC, enabled positive engagement with families and contributed towards population health surveillance of preschool children.

Published and disseminated at several Division meetings for GPs, Practice Nurses and Practice Managers between 2011 and 2012 and one National GP Conference in 2012 (Alexander, 2012)

Knowledge Translation – Implementation Research and Child Preventive Health

In 1997, Lomas (1997) described the “spluttering progress” that constituted the dissemination and uptake of research. He advocated for a cultural shift, from both researchers and decision-makers, and proposed new mechanisms to apply research to improve policy procedures and service delivery. The recognition of the different ‘end-users’ of research was key: legislative, administrative, industrial and clinical audiences- each would require a specific style of knowledge dissemination suited to their particular spheres of work. New organisational structures, processes and human resources would be instrumental to facilitate communication between researchers and decision-makers. The science of “Knowledge Translation” was therefore born out of the shift towards evidence based medicine (that had influenced researchers over the preceding decade) and the perceived failure to efficiently apply this knowledge to healthcare processes.

The plethora of terms and definitions of knowledge translation are underscored by the common challenge of moving from simple knowledge dissemination to actual *use* of knowledge. According to the “Knowledge-to-action Framework” (Figure 2) (Straus, Tetroe, & Graham, 2009) knowledge translation consists of two phases, ‘knowledge creation’ and the ‘action cycle’. Knowledge ‘creation’ consists of the distillation of knowledge through inquiry, synthesis and tool/product creation phases, to ultimately produce end-user guidelines or algorithms that can be applied directly to patient care. The ‘action cycle’ specifies seven action points within a dynamic and iterative process: identification of the problem; selecting what to implement; customizing to local context; assessing what determines use of knowledge (barriers); tailoring, implementing and monitoring interventions; evaluation of outcomes and enabling maintenance of knowledge use (Straus et al., 2009). The first two elements in this cycle, what is ‘done’ in practice and what best-evidence states ‘should be done’, is called, the “gap”. In 2012, Runciman et al. (2012) determined that in Australia only 57 per cent of adult healthcare encounters were in line with evidence-based (or consensus-based) guidelines and for 13

preventive healthcare indicators compliance was even lower, at 42 per cent (Runciman et al., 2012). It is this type of healthcare-gap that can be addressed through ‘Implementation research’.

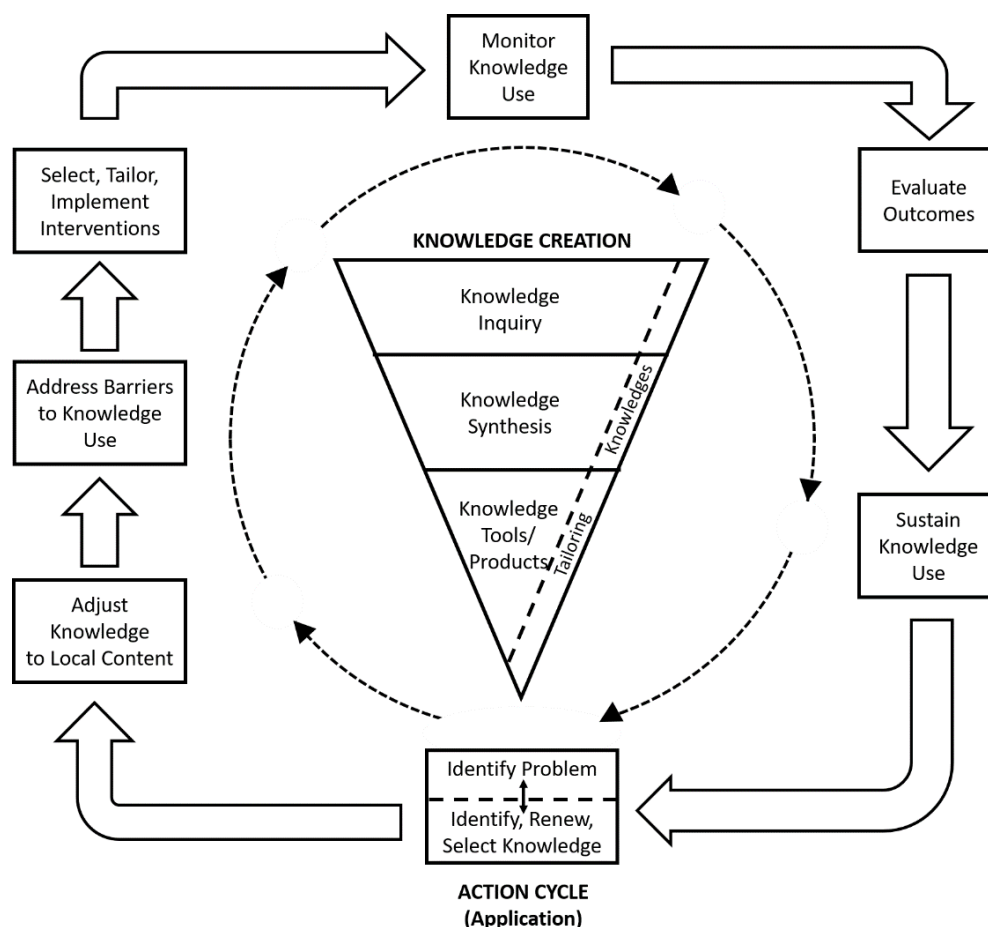


Figure 2. Knowledge-to-action Framework (Straus et al., 2009)

The Gap – Barriers and facilitators of effective delivery of preventive healthcare for young children

By 2014, government incentives to both providers (higher rebates for health assessment item numbers compared to standard consultation items) and parents [a 4 year-old child must have completed a health check for low income-families to receive a specific tax benefit (Department of Human Services, 2011)] were in place. Despite this, less than 50 per cent of eligible children completed a HKC, with wide variability between jurisdictions (Victoria 22 per cent, Queensland 65 per cent) (Medicare Australia Statistics, 2015). It is this variability that suggested that barriers were likely to be impacting delivery of preventive healthcare to young children.

General Practice – Known barriers to preventive healthcare for young children

GPs regard surveillance and health promotion as important aspects of child healthcare (Waters et al., 2000) but (prior to the HKC) significant barriers to preventive healthcare had been reported by GPs and other practitioners: insufficient time and inadequate financial reimbursement were barriers common to both US and Australian primary care workers (Jeyendra et al., 2013; Mackrides & Ryherd, 2011; Roberts, Palfrey, & Bridgemohan, 2004; Waters et al., 2000). However, in Australia, additional barriers were perceived: low self-efficacy amongst GPs (Oberklaid & Efron, 2005), the challenges of raising concerns when the child is sick (Waters et al., 2000), and (more recently) ‘crowding out’ of non-acute care and preventive visits by chronic disease management (Freed et al., 2011).

In the US it has been found that some practitioners assess child development based on their own *clinical* assessments of children (in the limited time the child is present in their rooms) and do not take into account parental concerns or use structured developmental screening tools, both of which can improve the detection of children with developmental needs (Hix-Small et al., 2007). Hix-Small showed that paediatricians were highly specific, but not very sensitive, at picking up developmental delays: the additional use of a screening tool identified 37 children (45 per cent of the sample) who were ultimately deemed eligible for services and had been overlooked by clinical examination alone (Hix-Small et al., 2007). Nevertheless, in the US where surveillance and the use of screening tools is actively promoted (American Academy of Pediatrics-Committee on Children With Disabilities, 2001), a national survey revealed that the majority of physicians do not use them: rather, they administer a non-psychometrically sound tool or they administer screening instruments in a non-standardised way (Halfon et al., 2004). Misplaced fears about causing parent anxiety add to clinician reticence to raise concerns, so that a ‘wait and see’ approach is commonplace (Raspa et al., 2015).

Surveys from the US demonstrate that almost half of parents have some concerns about their children that remain unaddressed (Schuster, Duan, Regalado, & Klein, 2000; Young et al., 1998). Parents who are not asked about developmental concerns may not disclose their fears voluntarily and an attentive

practitioner that demonstrates interest in the child's development is more likely to promote a dialogue with parents about their concerns (Glascoe, 2005). Debates about screening often highlight the resources and attendant anxiety caused by finding 'false positives'. Research has shown that children screened as 'false-positives' with mild developmental delays insufficient to trigger a need for early intervention are, however, linked to lower IQ scores and poorer school performance and often coexist with psycho-social risk factors (Glascoe, 2001). These families often benefit from referrals to quality child care and early education programs (Glascoe, 2001). Thus, when screening for child developmental problems, there are few disadvantages to adopting a lower threshold than may be acceptable for other health screening services (King & Glascoe, 2003).

A lack of knowledge of optimal referral pathways or unfamiliarity with local resources may risk further delays obtaining early intervention strategies for children identified as developmentally delayed. Schonwald et al. reported the implementation of Parents' Evaluation of Developmental Status (PEDS) screening questionnaires within two large urban practices and found that whilst there was a significant increase in the identification of both developmental and behavioural concerns there was no significant increase in overall rates of referral (Schonwald, Huntington, Chan, Risko, & Bridgemohan, 2009). Part of the intervention included provision of an early intervention-specialist 'in-house,' so problems may have been dealt with, but the possibility remained that practitioners did not feel compelled to act on the results of the screen. This underscores the importance of ultimately aiming to obtain the clinical outcomes of different approaches to monitoring the growth and development of children.

What is already known about effective primary care interventions

In the US, Quality Improvement (QI) strategies involving office processes have demonstrated significant improvements in children's preventive healthcare. An office system intervention, defined as "an organised series of interrelated activities conducted by multiple staff to achieve a specific purpose" (Leininger et al., 1996) obtained improved service delivery in an initial pilot with a small number of practices (Bordley, Margolis, Stuart, Lannon, & Keyes, 2001) and subsequently proved

effective in a randomised controlled trial (Margolis et al., 2004) and a state-wide intervention in Vermont (32 of 35 paediatric practices) (Shaw et al., 2006). Adopting a team-based approach and shared responsibilities are key to the QI approach. Extending office support to include coordinated care, however, has been found to further improve outcomes for families, and follow up of referred families and linking with community resources has been the focus of more recent “Assuring Better Child Health and Development -ABCD” studies (Earls et al., 2009).

In Australia, one study has applied an intervention directed at promoting HKCs with the delivery of healthy eating and physical activity messages (Bell, Campbell, Francis, & Wiggers, 2014). Over a two-year period, practice visits and professional development sessions held at GP Divisions, provided HKC-focussed training to measure height and weight, calculate Body Mass Index (BMI) and utilise tools to promote healthy lifestyle messages. Medicare data and follow up phone-calls to a sample of parents were analysed post intervention (only). Rates of HKC services, physical measurements and lifestyle message delivery in the intervention area were compared to rates in districts that had not received the intervention. Significant differences in the receipt of healthy messages were recorded (following adjustment for socio-economic status) in favour of the intervention (27 per cent vs 13 per cent, $p=0.0005$) along with an increase in the proportion of children completing HKCs in the intervention area (approximately 31 per cent vs 16 per cent). No significant differences in measures of height and weight were obtained (Bell et al., 2014). However, this study was limited by its analysis of post-test data only and therefore cannot eliminate other explanations for the differences observed. However, the implication of the findings is that whilst it is possible to boost service provision using a GP-centred intervention, the challenge to produce measurable clinical outcomes, remains.

Similarly, in adult patients, an Australian cluster randomised controlled trial of a practice facilitation and QI intervention aimed at prevention of chronic vascular disease and type 2 diabetes, was associated with an improved recording of cardiovascular disease risk, waist circumference, alcohol use and smoking status (between 2 per cent and 6 per cent for individual risk factors). This study also did not significantly reduce patient risk (Harris et al., 2015). This measure of improvement is

consistent with outcomes achieved by other adult preventive health evaluations (Hogg, Lemelin, Moroz, Soto, & Russell, 2008; Lemelin, Hogg, & Baskerville, 2001) and emphasizes the internal and external challenges of QI projects and other transformative processes (Duncan et al., 2014; Nutting et al., 2011).

Therefore, despite decades of research that demonstrates child health needs a strong foundation, and that a window of opportunity exists while the brain remains malleable, opportunities to identify and act on behalf of children, continue to be missed. GPs, acknowledged as playing a pivotal role in child healthcare, had been given an opportunity to make a significant difference to child health outcomes. Yet there were factors that seemed to be impeding this mandate. These are expanded upon in the following chapters.

Chapter 3. Qualitative Research

The scope of preventive healthcare for young children and the potential for interactions between the parent-child dyad and a number of health professionals, point towards the required intervention being complex in nature. The project's methodology was therefore based upon a framework established by the Medical Research Council (MRC) (UK), which proposed a system to develop and evaluate randomised controlled trials for complex health interventions (Campbell 2000) (Figure 3). The original framework details several phases for gathering evidence towards producing an effective intervention and reiterates the importance of a 'developmental phase' (aligned to Preclinical and Phase 1 studies in drug development) that may require the application of theory and additional explorative research. The reviewed MRC framework (Craig 2008) incorporated criticism that complex interventions often developed along a less linear course and adopted an iterative representation in the revised model. However, the original model brings clarity and enables the (novice) researcher to visualise the research proposal.

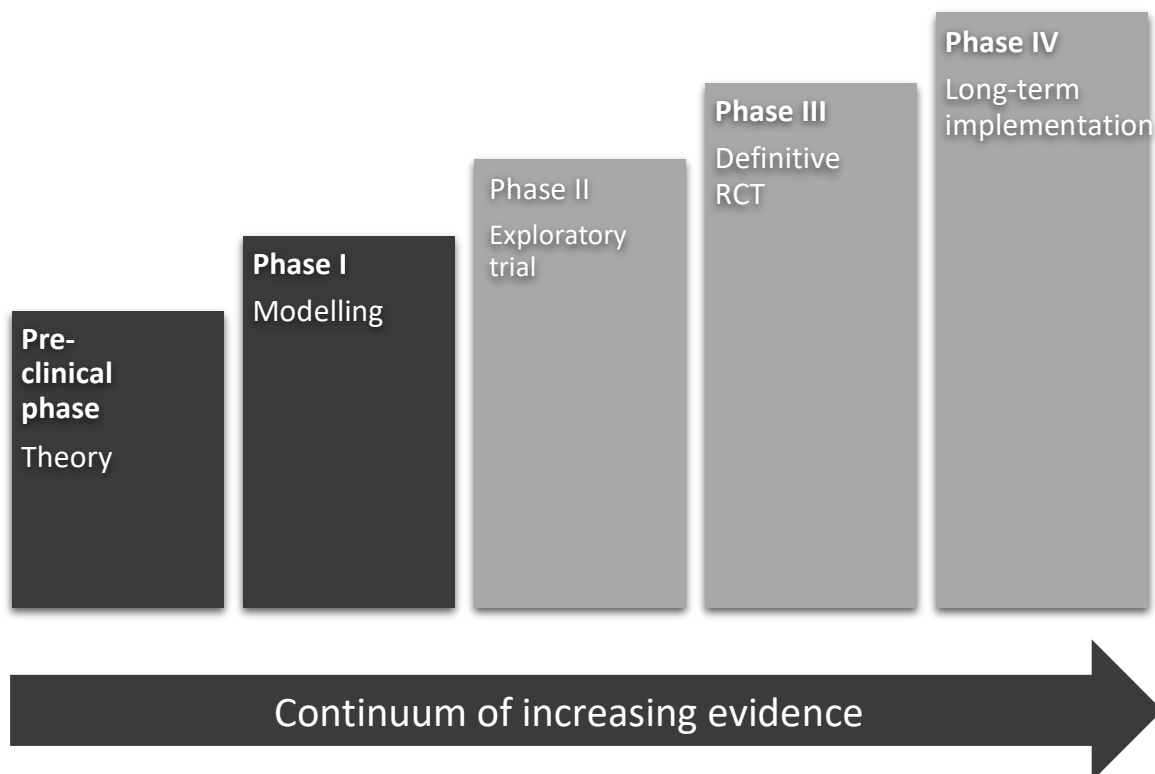


Figure 3. Medical Research Council Framework for evaluating and designing complex interventions

I opted to begin with explorative qualitative research because, when I began my PhD, little was known about the delivery of HKCs, who exactly was doing what, how often and in what circumstances. Nor was much known about the interactions between parents and general practice, parents' desire for HKCs, and their dealings with other professionals like Maternal Child Health Nurses, who already worked to deliver preventive healthcare to young children in some jurisdictions. This, and the perspectives of practitioners delivering HKCs, was the focus of my primary research.

A 'theory,' as "a set of analytic principals or statements designed to structure our observation, understanding and explanation of the world," should clearly explain "how and why specific relationships lead to specific events" (Nilsen, 2015). The choice of theory in this case was determined by the research question as it pertained to the two principal groups: parents and practitioners. These are each described in relation to the two streams of qualitative research that constituted the foundations for the intervention.

Parents' study – Methodological learnings

Settings and recruitment

Three socio-economic and culturally diverse areas of Melbourne were chosen and parents were recruited directly from these communities. The first area, located in the south-eastern bay side suburbs – Bayside – was more socioeconomically advantaged. The second area, I termed “Westgate”, encompassed the western suburbs of Melbourne (Wyndham and Hobson’s Bay) and was more socio-economically disadvantaged than Bayside. The third area, Dandenong, was selected to ensure a more culturally and linguistically diverse (CALD) population group.

The AEDC showed in 2011 that 10.5 per cent of children living in Bayside had developmental vulnerability in at least one domain and 4.2 per cent of children had two or more developmental vulnerabilities. This was well *below* the state average. Both Hobsons Bay and Wyndham had developmental vulnerabilities twice the rate (of Bayside) for at least one vulnerability and three times the rate for children with two or more vulnerabilities. This was *above* the state average (21.7 per cent and 11.5 per cent, respectively, for Hobsons Bay and 23.7 per cent and 13.1 per cent for Wyndham). Greater Dandenong demonstrated even higher vulnerabilities at three times the rate (of Bayside) for at least one, and four times the rate for at least two vulnerabilities (33.6 per cent and 16.5 per cent, respectively). This suggests that the children in the Dandenong area were the most ‘needy’ in terms of developmental support in our sampling triad.

Recruitment from this area proved more difficult than the other two areas and contact with the not-for-profit group ‘Playgroup Victoria’ (Playgroup Victoria, 2015) proved invaluable. They advertised the study in their electronic newsletter and provided direct access to facilitators of CALD-supported playgroups. Additional participants were recruited through snowballing of contacts and I relaxed the requirement to *live* in one of the three areas, to include parents *accessing services* (e.g. childcare) in the target areas. All other conditions for the study remained. Information sheets and consent forms were posted to parents and a suitable interview time was established following receipt of a signed

consent form. In a few cases the consent form was not received before the interview due to postal delays. In these situations, after ensuring the parent understood the study, verbal consent was obtained and audio recorded before the interview.

Interview questions

I used Andersen's Behavioral Model of Health Service Use (Andersen, 1995) to develop questions to ask in semi-structured interviews with parents to understand their perceptions of the HKC and preventive healthcare in general (see Appendix 3) (Andersen, 1995). The questionnaire was initially piloted in interviews with two parents who each had at least one child aged between 0-5 years. Subsequent refinements were made, which are listed in Box 3.

Box 3. Learning from two pilot interviews	
Learning point	Adaptation
Parents did not understand the term 'preventive healthcare' for young children	Introduce the topic early in the interview and list specific examples of preventive healthcare – height, weight, speech, vision, hearing and behaviours – to guide parents
Parents included all children in their response as one child's experience influenced the others	Keep age of one child as criteria for eligibility (aged 3 – 5 years eligible for HKC) but allow experience of any child in the immediate family to be considered
The subject matter is potentially sensitive. For example: the impact of a diagnosis of child-disability and the affect this has on the parents' relationship	Be prepared to suggest mental health counselling in the event that a participant becomes upset recalling story during an interview (as stated in Ethics submission and Explanatory statement)
Parent education and knowledge of child disability do not determine actions. Parents may decide not to take action depending on beliefs and priorities e.g. birth of a sibling.	Expect a variety of responses that do not necessarily correlate with my own belief systems and keep responses neutral
Participant tells the story from the beginning. This might seem irrelevant but may be required to understand context and may reveal the parent's search to explain disability	Allow participant sufficient time to express viewpoint and ensure no interruptions to interview process

In addition to the adaptations listed in Box 3, I also opted not to ask about household income outright. Research has consistently shown that asking about income is a sensitive topic in interviews and participants are wary about disclosing information related to their finances (Tourangeau & Yan, 2007). Instead I decided to ask parents if they received a “Family Tax Benefit Part A” entitlement. This is an additional payment received by families of children under the age of 16 years, when the adjustable taxable income of the family is less than \$45,114, thus qualifying the family as low income. This, and private health insurance status, gave an approximate measure of socio-economic status pertinent to child health.

The questionnaire began with the collection of basic demographic data and followed a semi-structured format, utilising open style questions where possible. Demographics, which were thought to be more ‘sensitive’ (year of birth, education level, and receipt of Family Tax Benefit Part A), were collected at the end of the interview and participants were encouraged to provide any additional information they thought was relevant to the interview. In this way, interviews were directed by the guiding questions but were not constrained by the topics, allowing themes to emerge.

In this study, the aim was to interview approximately 30 parents. Recruitment began in Bayside, moved to the Westgate community and ended in the Dandenong area. The progress of interview completion followed a similar transition so that data saturation was achieved by the twenty-eighth interview [no new data was emerging (Glaser & Strauss, 1967)] and included at least one deviant/negative case (Morse, 2015) (Box 4) (determined by an experienced qualitative researcher). The final dataset included 28 parents with a combined total of 67 children (of all ages under 18 years). Although participants were not specifically asked for any medical diagnoses assigned to their children, during interviews parents alluded to 20 health-related problems: three medical problems (e.g. asthma), one allergy problem, one oral health problem, and 15 developmental problems (speech and vision most common). This gave a prevalence of 22.4 per cent of developmental problems. This aligns with Australian national prevalence data (Australian Government, 2016) and reported rates of

parent concerns (Woolfenden et al., 2014) but is not a true estimate of developmental risk because parents self-selected for our study (selection bias).

Box 4. Negative case analysis

One mother's experience and preventive healthcare practice on behalf of her children centred on the use of complementary and alternative medicines (CAM) that set her apart from the sample. As a child she had experienced her own parents accessing chiropractic services regularly and she followed this practice with her own children to maintain 'a healthy immune system'. Her personal discovery of an intolerance to wheat and gluten that caused her to feel tired all of the time, led her to temporarily withdraw these foods from her child's diet when she noticed symptoms of lethargy in her child. This she said was confirmed by her naturopath who performed tests using an instrument that required holding a copper pipe connected to a screen via wiring (possibly bio-electrical impedance analysis, for which there is no evidence). Both her children had been homoeopathically vaccinated and although she attended a GP herself for pap-smears, the only time she recalled taking her children to the GP recently was in relation to an upper limb fracture in the younger child. She joked that whenever her children's school asked her to provide details of their doctor she would give the Naturopath's contact information. Although she had taken her children to the MCHN initially, she had not pursued appointments after 18 months of age, believing that because she could see her children were growing well, she had no need to attend. She had however, taken one child to an optometrist when she noticed a 'squint' and had sought opinions regarding management from two different ophthalmologists. This mother expressed high levels of autonomy and confidence managing the health of her children.

Parents' decision making and access to preventive healthcare for young children: applying Andersen's Model

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Accepted for publication
28 May 2013

Keywords: Andersen's theory, general practice, parents, preventive healthcare, qualitative research, young children

Abstract

Background and objective Implementing preventive health care for young children provides the best chance of improving health and changing a child's life course. In Australia, despite government support for preventive health care, uptake of preventive services for young children is low. Using Andersen's behavioural model of health-care utilization, we aimed to understand how parents conceptualized their children's preventive health care and how this impacted on access to preventive health-care services.

Design Semi-structured telephone interviews conducted between May and July 2011.

Setting and participants Twenty-eight parents of children aged 3–5 years from three diverse socio-economic areas of Melbourne, Australia.

Results Thematic analysis showed parents' access to child preventive health care was determined by birth order of their child, cultural health beliefs, personal health practices, relationship with the health provider and the costs associated with health services. Parents with more than one child placed their own experience ahead of professional expertise, and their younger children were less likely to complete routine preventive health checks. Concerns around developmental delays required validation through family, friends and childcare organizations before presentation to health services.

Conclusions To improve child preventive health requires increased flexibility of services, strengthening of inter-professional relationships and enhancement of parents' knowledge about the importance of preventive health in early childhood. Policies that encourage continuity of care and remove point of service costs will further reduce barriers to preventive care for young children. Recent reforms in Australia's primary health care and the expansion of child preventive health checks into general practice present a timely opportunity for this to occur.

Introduction

It is increasingly recognized that the onset of chronic diseases, such as hypertension, cardiovascular disease, stroke and diabetes, is predestined by events *in utero* and early childhood.^{1,2} Similarly, compelling associations link childhood emotional experience with an increased risk of adult mental and physical health.³ The pre-school period is a critical transition point⁴ where high-quality health interventions can reap benefits, which may extend across the life course.⁵ Accordingly, timely and appropriate delivery of preventive health services in early life, defined as activities to stop, interrupt or slow the likelihood of developing a disease and its progression,⁶ has assumed great priority on national health agendas and in health services delivery.

In Australia, where health care is both privately and publically funded, maternal child health nurses, paediatricians and general practice services intersect across the early years of life to provide relatively comprehensive immunization, developmental surveillance and screening services.⁷ Childhood immunization coverage is high (93 per cent of 2-year-olds), neonatal hearing screening programme participation is increasing, and exclusive breastfeeding to 6 months is widely promoted.⁸ A snapshot of children's development as they enter school shows that the majority (75%) are doing well.⁹ However, health risks for Australian children exist: currently, 22% of children are considered developmentally vulnerable and 4.9 per cent have special needs.⁹ Immunization coverage at 6 years is lower than that at 2 years,¹⁰ one-fifth of pre-schoolers are overweight or obese,¹¹ and dental caries affects half of 6-year-olds.¹² Additionally 11 per cent of 2-year-olds and 20 per cent of 5-year-olds suffer clinically significant behavioural problems.¹³ Moreover, different population groups within Australia experience widely varying levels of morbidity, with children living in remote or low socio-economic areas and indigenous children the most disadvantaged.¹⁰

In response to these figures, and as a means of containing the costs of an ageing population with increasingly complex chronic diseases, the Australian government has set targets for child preventive health on healthy eating, body weight and physical activity, and, most recently, child mental health.^{14,15} Responsibility for much of this developmental surveillance rests with maternal and child health nurses (MCHN), registered nurses and midwives with additional qualifications in child and community health, located within local council areas, with services free at the point of care. In the state of Victoria, where this study was conducted, parents are encouraged to make 10 key visits scheduled from birth to three and half years, the first seven of which are meant to occur before the child's first birthday.¹⁶ Uptake of services is excellent (90% of families complete the first four visits) but drops off to less than 60 per cent for the final visit.¹⁷ Evaluation of MCHN services has focussed on maternal rather than child health outcomes, including maternal emotional health,¹⁸ use of the Edinburgh Postnatal Depression Scale,¹⁹ maternal service engagement and rates of normal vaginal delivery.²⁰

Internationally, health checks of young children by physicians have demonstrated increased detection of physical, developmental and behavioural problems.²¹⁻²⁴ In 2008, to improve monitoring of children's health, the government introduced the Healthy Kids Check (HKC) – a pre-school health assessment aimed at 4-year-old children. HKCs are conducted in general practice, an appropriate setting given that four of five Australians visit a general practitioner (GP-equivalent to a family physician) each year, and health promotion and prevention are key activities in the provision of patient care.²⁵ Delivered by GPs, general practice nurses or Aboriginal health workers, a rebate can only be claimed once, and only when pre-school vaccinations are completed.²⁶ Although publically funded (a Medicare rebate is available to parents for this item of care), initial uptake of the HKC was much lower than anticipated and only 16 per cent of 4-year-olds

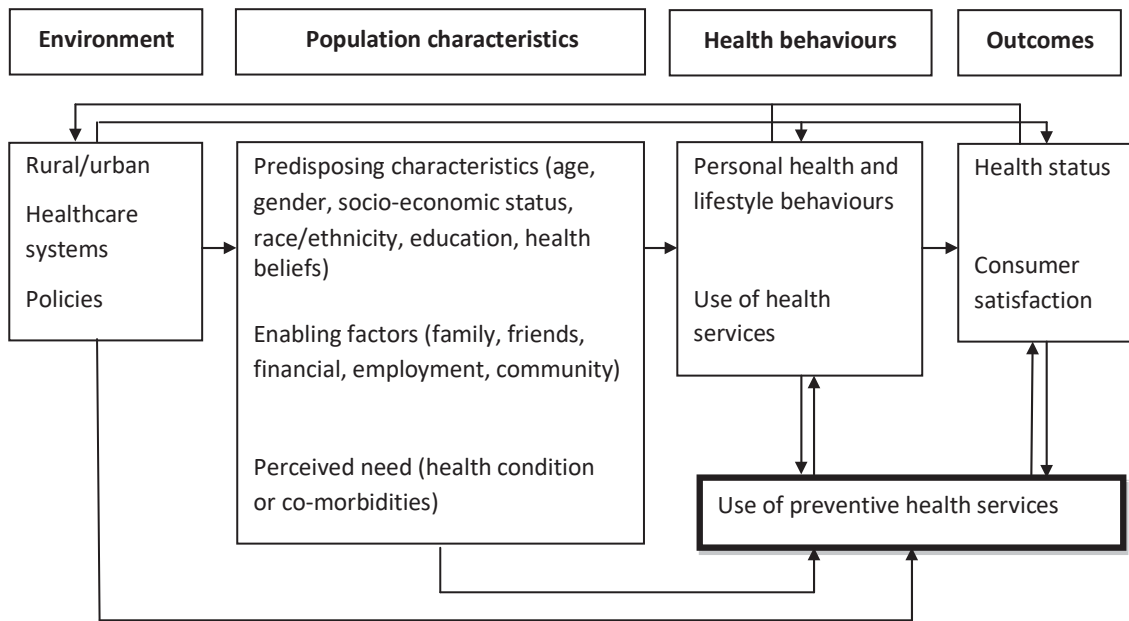


Figure 1 Andersen's Model of behavioural use of health services, and preventive health services.

completed a HKC in the first year, with wide variation between and within states.²⁷ Reasons for this discrepancy are not well understood in the Australian context. Thus, the aim of this study was to explore parents' perceptions of preventive health care for children. Using Andersen's behavioural model, we explain how parents acquire knowledge of 'normal' child health and development, describe how they recognize and deal with possible developmental problems, explain their intentions to undertake preventive child health care and portray their experiences of accessing services. We begin by providing an overview of Andersen's theory and our methods before presenting our findings, discussion and key conclusions.

Theoretical framework

Andersen's behavioural model is a well-established theoretical framework used to understand individuals' use of health services and equitable access to health care. In the model, *need* for care determines how much an individual with certain *predisposing characteristics* (age, sex and culture) uses health services according to their personal and community

resources that *enable* access. *Environmental* factors (physical, economic and political components including the health-care system), *health behaviours* (health promoting behaviours and use of services) and *outcomes* (consumer satisfaction and health status) influence access to health-care services and were added to later phases of the model (Fig. 1).²⁸

For more than 30 years, Andersen's model has been empirically applied to multiple facets of medical care across diverse populations.²⁹⁻³¹ Studies have shown that *predisposing* socio-demographic factors such as gender, young age and ethnicity are barriers to accessing services³²⁻³⁴; specific health beliefs determined by culture, personal attitudes and values are powerful predictors for health service use³⁵; educational achievements, increased household income and having health insurance *enable* access;³⁶⁻³⁸ and perceived *need* is a significant determinant for seeking care.^{37,39} Other components of the model, health policy and health-care safety-net services,⁴⁰ and *health behaviours* (previous use of services)^{33,36} also impact on access to services.

For children's preventive health-care, *predisposing* risk factors for non-participation have

been found to be young parental age,⁴¹ family structure (particularly single parent families)^{41,42} and having older siblings.⁴¹ Language barriers may be the underlying reason for reduced use of services according to ethnicity⁴³ or may indicate wider disparities in health behaviours and use of health services.⁴⁴ Research shows the mixed effect of parental health beliefs on access to preventive child health-care services. US data showed that mothers' beliefs about their child's health were not influential,⁴⁵ but parents whose beliefs matched local guidelines for the timing of check-ups were more likely to follow through with care.⁴⁶ Families that lack personal resources (lower income, lower levels of education) have been found to be less likely to receive preventive services for their children.⁴¹ Outcomes for access were mixed with respect to *need* (increased in US study where the child was reported sick in the past year⁴⁶; decreased in a Danish study with increasing number of hospitalizations⁴¹) and may reflect differing opportunities for preventive care in different health environments.

Qualitative studies have successfully applied Anderson's model to a diverse range of settings and health issues^{32,47,48}, and quantitative studies have utilized Andersen's model to understand access to child health services including the use of emergency department for non-urgent care,⁴⁹ asthma care⁵⁰ and preventive care.⁴⁶ However, to the best of our knowledge, Anderson's model has not been qualitatively applied to child preventive health-care services.

Method

Setting

Three socio-economically diverse urban areas of Melbourne were chosen for the study: 'Westgate' (low socio-economic), 'Bayside' (high socio-economic) and 'Dandenong' [culturally and linguistically diverse (CALD)]. This third suburb was targeted to ensure the sample included the opinion of parents living in Australia for less than 10 years, as it was expected

that their experience of accessing preventive health care could be quite different.⁵¹

Recruitment strategy

Parents were recruited from the community. The study was advertised in kindergartens, playgroups, community centres, maternal child health centres, libraries and supermarkets. Additional participants were recruited through snowballing. Potential participants were asked to contact the researchers and were selected if they had at least one child between the age of 3 and 5 years, lived in one of the three study areas, spoke English and had resided in Australia for more than 12 months. Recruitment was stopped when data saturation was achieved.⁵²

Interviews

Data were collected between May and July 2011. Telephone interviews were conducted by the first two authors, following receipt of signed written consent. Interviews were tape-recorded and lasted approximately 45 min. Respondents were offered an A\$75 gift voucher to participate in the study. A semi-structured interview guide, informed by Anderson's model, was used to question parents on their children's preventive health (Table 1).

Data analysis

Data were analysed using thematic framework analysis comprising inductive and deductive techniques. The first two authors read, re-listened and re-read each transcript to familiarize themselves with the data and check for accuracy. They independently coded the data, then met to compare and discuss results and obtain consensus. As more codes were discovered, previously coded transcripts were checked to ensure that the codes still applied, in an iterative process to maintain quality within the data.^{53,54} The third author was consulted to review the codes, resolve differences and oversee the linking of codes into categories. Data

Table 1 Andersen's Behavioural Model of Health Services Use and development of questions for semi-structured interview of parents

Domains	Major concepts	Components	Examples of questions
Environment	Health care system	Personnel - Medical and other Organisational- health care systems in place	Do you have a regular doctor? What services are available to you in your community to help you monitor your child's health, growth and development? When considering visits to the doctor, how important is it for you to find a doctor who bulk-bills? Have you ever received an invitation for your child to attend a health check?
Population characteristics	Predisposing characteristics Enabling resources Perceived need	Demographic and social Health beliefs Personal and family	Could you tell me a little bit about you and your family? What language is spoken in the family home? I am interested to hear your views about your child's growth, development and behaviour – How do you monitor these aspects of your child's health? Do you ever discuss issues about routine health care with your family or friends? Do you have any health insurance? Could you tell me about the health of your child in general over the last 12 months? Have you ever been concerned about your child's growth or development? What about eating and sleep? What about your child's emotional development and getting along with others? – What did you do?
Health behaviour	Personal health practices Use of health services		Do you ever personally attend your doctor for a health check? Has your child had a Healthy Kids Check or a pre-school check? How about check-ups with other health professionals? for example, dentist and optometrist Think back to the last time you had your child weighed/measured? Can you tell me about that?
Outcomes	Consumer satisfaction		How satisfied are you with your maternal child health nurse services? What's your impression of the care you have received from doctors in the last few years?

were finally imported into NVivo 8.⁵⁵ Data were de-identified to ensure participant anonymity. Approval was obtained from Monash University Human Research Ethics Committee.

Results

Twenty-eight interviews were conducted. The mean age of participants was 40 years, and only one participant was male (Table 2). Ten participants were from CALD communities and had resided in Australia for less than 10 years (eight resided in the Dandenong

region). Approximately half the sample could be classified as low- to middle-income earners (based on receipt of family tax benefits and health insurance status). Eleven per cent of the sample had not completed secondary school, 64 per cent had an undergraduate degree, and 21% had a postgraduate qualification.

Four themes were identified within Andersen's model: (i) the families' need, health belief systems and enabling resources (Population characteristics), (ii) health behaviour and parents' personal health practices, (iii) parents'

Table 2 Characteristics of parents interviewed (n = 28)

	Number or range
Age (years)	
Mean	40
Range	30–47
Gender	
Female	27
Male	1
Migrant less than 10 years	
UK	4
India/Ceylon	2
China	1
Vietnam	1
Hong Kong	1
Lebanon	3
Iraq	2
Marital status	
Married	25
Separated	3
Number of children	
3–4	11
2	15
1	2
Health Insurance	
Yes	10
No	14
Unknown	4
Family Tax Benefit Part A*	
No	10
Yes	16
Unknown	2
Education level	
Not completed secondary school	3
Other qualification after secondary school	7
Undergraduate	12
Post graduate	6

Recruited: 12 Playgroup Victoria newsletter; 4 kindergarten; 2 community centre; 1 supermarket community notice; 1 maternal child health centre; 8 snowball.

*A government benefit payable for each child and adjusted according to number of children and taxable income.

satisfaction with the health service and continuity of care and (iv) financial barriers experienced by families when seeking preventive health care for their children.

Families' need, health belief systems and enabling resources

Perceived 'need' for preventive health services was primarily determined by birth order and

the age of the child. In the early weeks of infancy, particularly for a first child, parents felt less confident managing feeding, growth and sleep behaviours and sought guidance from MCHN services. Contact with services diminished as the child got older. With subsequent children, parents were more confident, balancing the advice received from providers against knowledge gained from past experience. They frequently prioritized experience over expertise.

Especially being the second time now, I listen to the advice they give me about the feeding and things like that, but I think a lot of it is you have to just sort of decide what you're going to try yourself. (Belinda, 40 years, Bayside, 2 children)

Because she's my third I'm like, 'Well, if she wants a dummy I'll do it'... It just seems it's not the pressure I think of your first one... it's not like I'm a bad mother, I'm doing it all wrong. (Rebecca, 38 years, Bayside, 3 children)

Parents were familiar with the schedule of visits proposed by MCHN services and the immunization requirements for young children. However, between 12 and 18 months of age (when primary vaccinations were completed), parents re-evaluated the need for ongoing involvement with maternal and child health services. In our sample, one-quarter (7/28) had not completed a visit at three and a half years. Some parents felt confident they could recognize developmental problems and others stated they were too busy managing their own or another child's health problems. CALD parents also said they preferred to use a doctor who spoke their first language.

Other cultural factors also influenced continuation with preventive services. Parents from overseas countries made positive comparisons favouring Australia's child health services. However, if advice conflicted with cultural expectations, satisfaction diminished and led to early discontinuation of services. Shada, (39 years, Dandenong, 4 children) for example, decided she would wean her children according to Lebanese practices and discontinued MCHN visits after 12 months:

I have had children for 15 years... In my country I start feeding my children at 3 months... But here they are told, no you can't do this, maybe after 6 months or 8 months.... I feel like I have experience, you know more than nurse.

Parents believed that a family history of developmental or health problems constituted a genetic risk and meant they became watchful of their children's health and development. There were frequent references to a personal or family history of vision problems such as 'squint' and 'short sight', height variations, speech delay, dental health and medical conditions such as asthma.

I suppose in terms of having reduced hearing through glue ear, both their dad and I have had it, so I suppose I was fairly conscious and they were both late talkers and with [my son] I was talking about it at his 18 month maternal health nurse check-up. (Alison, 37 years, Westgate, 2 children)

Alongside family history, a culture of awareness for the timing of immunizations, maternal child health checks and kindergarten requisites was created through social relationships. This was an important personal resource that 'enabled' parents to acquire knowledge of services. Parents of young children sought relationships with other families with similarly aged children and consciously or instinctively checked their child's development against other children. Parents also expected childcare agencies to help them with monitoring, and in this data set, professionals who flagged potential problems to parents were MCHNs (3), kindergarten teachers (3), primary school teachers (3) and childcare workers (1).

I suppose because they're at childcare 3 days a week, seeing them there, and we go to playgroup, and we interact with other children's parents, so I can sort of gauge that they're doing okay. (Vanessa, 39 years, Bayside, 2 children)

They had a couple of hours once a week at occasional care and then a couple of hours at kinder so from that point of view their developmental levels were monitored from those sort of organisations. (Justine, 42 years, Bayside, 3 children)

Social influences played a significant role in uncovering a developmental delay. Parents consulted books and searched Websites and blogs to determine the likelihood of a problem, then corroborated their uncertainties with other significant individuals before taking the next step. However, parents were cognisant of being labelled 'overanxious'.

I had a friend over, and I said, 'Does she look a little bit cross-eyed?' And we were looking at her and it didn't seem all that noticeable again. And then the next day my husband and I were watching her, and she would look cross-eyed from time to time, but then it would sort of correct itself. So I rang the maternal health nurse and got an appointment for her. (Jenny, 32 years, Westgate, 2 children)

Health behaviour and parents' personal health practices

This group of parents was already engaged with preventive health services and recognized the value of healthy lifestyles. Mothers (20/28) stated that they attended their GP for pap smears or blood tests, and two had undertaken personal health checks. All children had been vaccinated, and parents talked about exercise and healthy eating as their responsibilities. They talked of difficulties counteracting a busy lifestyle and moderating fast food, and friendships and peer groups were regarded as important for their child's social and emotional well-being.

How parents sought health care for themselves influenced the choices they made on behalf of their children. Six of seven parents who used complementary and alternative medicine (CAM) administered it to their children, believing that the practice would 'strengthen their immune system'. Some parents used vegetables or herbs familiar from their cultural background. One parent who regularly received acupuncture, chiropractic services and Chinese herbal medicines did not have a regular GP and had chosen to 'homoeopathically vaccinate' her children, terminating MCHN visits after 18 months:

The information I was getting from them was stuff that I could already see in my child and we're a tall family, so they were always at the top end of the percentile and ...I guess for me, my belief was that they are just a set of figures. I believed that they were well and growing well. (Natalie, 39 years, Bayside, 2 children)

Parents' satisfaction with the health service and continuity of care

Satisfaction with health services affected the likelihood of continued engagement. Mixed results were obtained in relation to satisfaction with MCHN services. Many parents expressed high levels of satisfaction with the 'light-hearted' environment and time allocated for appointments. Parents were comfortable asking for advice and described nurses as helpful, supportive and caring. Those who retained MCHN services through the preschool years alluded to the continuity of the relationship, the skill set of the nurse and how she handled the children, and the environmental ambience, including rooms geared for children and availability of promotional materials such as books and CDs.

Parents expected that in return for the efforts they made to attend routine health checks, the nurse would address their individual concerns and not just check developmental items. There was significant dissatisfaction when this expectation was not met.

I've always been very careful with my follow-ups. The last one I did probably last year, his four year old follow-up, and that was extremely basic. I was quite disappointed with it because I remember taking my daughter...she had to build blocks, she had to do this, she had to do that - there was quite a few different steps that they ran through with her...[This time]she said 'Did I have any concerns?' and I said I'm just a bit worried about his pronunciation. She said 'Oh no, that'll come with time'. And basically it was weigh him, measure him and out the door. (Virginia, 43 years, Westgate, 2 children)

The use of checklists was regarded as 'superficial' and 'base level stuff', and one parent articulated that a 'good' MCHN should ask 'curious questions' to probe responses made on a checklist

more deeply. If parents felt that the check was basic, they did not feel there was anything to be gained by continuing to attend MCHN checks.

I've never ever felt that anything that they've asked wouldn't be obvious, would highlight anything anyway. I think that's another reason I probably don't go back very often. I don't sort of think anybody tries too much if you like. (Ella, 39 years, Bayside, 2 children)

Parents were also generally satisfied with their GP but pointed out significant differences between GP and MCHN child health services: practitioner availability of time and type of health care. Appointments with GPs were shorter and attendance usually involved a sick child with an acute health problem. Overall, parents lacked knowledge of preventive services offered by GPs, except for immunization services (50 per cent of participants). They could neither recall receiving routine preventive services for children nor asking the GP for advice or support with developmental issues.

I'm from that generation that kind of don't want to bother the doctor in some respects... He's literally on a needs must basis, when they're sick we go to the GP. I wouldn't even seek advice from my GP... I wouldn't go and say I'm really struggling with my children, I'm not sure if I can cope with them. (Rebecca, 38 years, Bayside, 3 children)

When prompted to consider specific aspects of preventive health care for children, parents recalled their GP had measured their child, but thought this was to calculate a drug dose not to monitor growth. Four parents said their child had received a health check from the GP with their immunization at 4 years. Two families were offered HKCs by GPs, but declined invitations as these clinics were not their regular point of care. Only one parent specifically requested a health check for her child, although her experience suggested the clinic doctor did not know about HKCs and included a blood test (not a routine part of the check).

As older siblings transitioned from the MCHN to the GP, parents looked for convenience with appointments and streamlined the family's health care.

Then if there were any other kinds of issues they would be able to deal with them on the spot rather than me having to be referred on ...to see a doctor... You know, kill two birds with one stone I suppose. And if there had to be prescriptions done or anything like that then you could do it. (Angela, 47 years, Bayside, 3 children)

As a result, younger children were more likely to miss preventive care visits.

Immunisation, I've been struggling with that for the last 6 months... It's just a scheduling problem, remembering to do it... just for the third child, I think it's just life with three kids and it's quite challenging. (Julia, 41 years, Westgate, 3 children)

And as attendances for acute health issues accumulated, a feeling of continuity of care with the GP developed, as the scheduled MCHN visits declined.

I'm familiar with the doctor, there's a relationship there and I honestly don't know who I'd see if I went down to the maternal child health centre tomorrow.

Financial barriers to preventive health services

Parents from all three socio-economic areas cited cost and frequency of GP visits with small children, including the cost of medications, specialist visits, pathology services, allied and dental services, as potential barriers to health care, including preventive services. Whilst parents prioritized their children's health care, privately billed services were frequently beyond their reach, and resorting to public services meant children experienced delays accessing speech pathology, occupational therapy and psychological services.

Maternal and child health services are free at the point of service, whereas GP services are usually privately billed, with some of the costs rebated by the Australian Government insurance scheme, Medicare. Some practices offer direct billed (bulk-billed) services, paid to the practitioner at a lower rate than the government scheduled fee, so that the patient does not incur out of pocket expenses. Amongst this group of

parents, most (20/28) actively sought 'bulk-billed' services for their children. All families from the Dandenong area (low socio-economic, CALD community) were receiving health care that was direct billed. The four HKCs obtained appear to have been billed in this manner. Some parents prioritized continuity of care over cost, particularly for chronic health-care issues.

Actually there are two [GPs] that I use, one does bulk billing for children, they tend to be a bit more inconsistent in terms of who the doctor is there, but that's okay for straight forward sort of illnesses.... And then there is another one... that I would probably categorise as the long-term treatment one. So that's who I go to for [my daughter's] asthma... She's very good... very approachable... and has a nice calm manner about her. Yeah she's great. But you know she's also \$65 a visit. (Justine, 42 years, Bayside, 3 children)

Dental services, which are generally privately billed and not rebated by Medicare, were a major source of financial anxiety to parents across each study area. One parent lamented that she could not afford to complete her daughter's orthodontic work and could not access treatment for her 4-year-old son's severe dental caries. In contrast, optometrists were well regarded for the fact that assessments were both comprehensive and 'bulk billed'.

Discussion and recommendations

Through the application of Andersen's behavioural theory, our study clarifies parents' intentions to undertake health checks for their children and presents the social context through which parents recognize and act upon developmental concerns.

Parents in this data set were personally engaged in a range of preventive services and actively monitored their children's health with regards to diet, exercise, growth and social well-being. All parents had immunized their children, and only one had not accessed maternal child health services. Child preventive health care was influenced by health beliefs and personal health practices. Considerable overlap between these two domains existed in relation to cultural back-

ground. These findings resonated with earlier studies which showed parental beliefs about: the use of complementary medicines,⁵⁶ the timing of routine visits,⁴⁶ and immunization,⁵⁷ all affected preventive health-care uptake for their children. Our study also revealed the significance parents assigned to family history when it came to anticipating problems.

Parents had good knowledge of the schedule of maternal and child health visits. Nevertheless, a quarter of our sample had ceased to visit the MCHN by the child's second year. Arguably the number of preventive visits – 16 in total – proved onerous for many families, especially where there was more than one child and siblings were older. As older siblings switched from the MCHN to the GP, parents sought to streamline health care, so that younger children were less likely to complete MCHN visits. These data correlate well with quantitative studies which have shown that having older siblings increases the risk of non-adherence to the schedule of preventive child health examinations.⁴¹ Parent's beliefs in their own capabilities influenced this transition as did the need for expediency. The GP administered HKC goes some way towards increasing flexibility of preventive health-care services to children, with practitioners ideally placed to tap into family history and cultural beliefs. Future developments could increase this service beyond the current single time point for its delivery.

Anomalies in children's health were initially picked up in home, kindergarten, school and childcare settings. Having an environment in which parents could compare their children's development was an important determinant of parents' help-seeking. Parents expected agencies routinely involved with their children to help them monitor development and often discussed concerns with these professionals first. This hierarchy of information seeking serves as a reminder to health professionals to thoroughly evaluate parents' concerns when they are raised. A major goal of the Australian Government is to have a more effective early childhood development system with coordinated, interdisciplinary, flexible services that

can refer to early intervention services.⁵⁸ This could be augmented by 'Medicare Locals', primary health-care organizations recently established in Australia to better respond to local health care needs and connect GPs and other health services.⁵⁹ These organizations are ideally placed to foster liaisons between GPs and early childhood education and care, to integrate services and streamline referral processes.

Our study also highlighted the absence of routine preventive health services for children from general practice. Parents generally took their children to the doctors when they were sick, did not realize GPs had a stake in preventive health care for children and were reluctant to make appointments for non-specific concerns. Developmental problems were not presented to the GP, and although parents were aware that GPs weighed children, they believed this was to calculate a drug dose and not to monitor growth; however, national guidelines suggest that GPs should measure BMI twice a year for their paediatric populations.⁶⁰ Only one parent had specifically requested a HKC, despite them being available for the last 3 years, and few parents had even heard of them. The mismatch between government expectations for the delivery of preventive care and actual receipt was also a major finding with adult preventive care in general practice (where the focus of consultations was also acute care) and holds major implications for putting prevention into practice.⁶¹

Parents regarded continuity of care, both with MCHN and GP services, as important. Parents were unlikely to accept health checks from practices that were not the regular source of health care and considered that their child's cooperation was dependent upon familiarity with the practice and the practitioner. Adult patients who regularly attend one practice report greater provision of preventive care.⁶² Continuity of care may prove to be an important determinant of the quality of preventive health care for children in Australia, as it has overseas⁶³⁻⁶⁵, and policies that encourage continuity (e.g. increased insurance rebates for enrolment with a nominated provider) have previously been considered for other population groups.⁶⁶

Parents expected health checks for their children to be delivered without incurring costs to them. Although some parents were paying part of the costs of acute GP care, most actively sought bulk-billed services, which are usually available in metropolitan Melbourne. The situation could be quite different in rural and remote regions of Australia. Mazza *et al.*⁶¹ have shown that many Australian adult patients cannot afford the costs associated with GP preventive care consultations, and this is likely to be the case for child health checks. Whilst general practitioners are incentivized to provide bulk-billed services to children (\$5.90 additional rebate⁶⁷), practitioners bemoan the widening gap between the costs of delivering good quality general practice services and poor indexation of the Medicare Benefits Schedule.⁶⁸ A firm commitment to providing primary health care to children may need to revise such incentives. The costs of dental services for children and restricted access to allied health and other specialist services also need to be addressed if children are to achieve optimal health before commencing formal education.

Conclusion

In July 2011, at the completion of data collection, there was a change in government policy that targeted underprivileged children. Changes to rules surrounding Family Tax Benefits, meant that families with a child turning 4 years old, who received an income support payment, must complete a health check with the GP or MCHN to qualify for the benefit.⁶⁹ This is likely to increase parent demand for health checks, and follow-up research needs to be conducted to determine whether provision of HKCs has changed.

The strengths of this study include the theoretical underpinnings of the research and methodological rigour. We also strove to seek the opinion of parents from culturally diverse backgrounds ($N = 10$), typically a group more difficult to reach, and this was a community-based sample with only one participant obtained from a (maternal and child) health service. We did

not explore the views of parents in rural areas where parents may have had different experiences of child preventive health care. Participants who volunteered for this study did not include younger-aged parents or families where both parents worked full time, and only one father took part. It is also likely that this group of parents were healthier than average and that they were more engaged with preventive health services. The comments made in this study would be typical of many parents, however, and may, in fact, represent the 'tip of the iceberg', as we could expect these groups to experience additional barriers. Future research could target the opinions of these groups of parents, could target more single parents and fathers and could be repeated across different areas of Australia.

Additional research could also address inter-professional relationships at the community level to better understand how developmental concerns, which present to agencies outside of health care, can be expedited. This would build a more complete picture of child preventive health care and is an important step when child health is so dependent on parent-professional relationships. An evaluation of the outcomes of health checks for children would give substance to the drive for parents to attend professional childhood developmental assessments, but the introduction of the HKC is a positive first step towards increasing access through extension of services into general practice.

Acknowledgements

Playgroup Victoria for help with recruitment of parents.

Conflict of interest

None.

Source of funding

This work was funded by the Shepherd Foundation, Malvern, Victoria, Australia. The funding body had no involvement in the conduct of the research.

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Comparison of findings with new research

Since the publication of this article, barriers to developmental surveillance amongst 12 CALD families and 27 service providers (including two GPs) has been researched using the same behavioural model (Andersen's framework) by a group in Sydney, Australia (Woolfenden et al., 2015). This study also recruited parents from parenting and multicultural groups, but purposeful sampling from differing CALD backgrounds "with varying degrees of service exposure" meant five of the 12 parents interviewed, had a child with a developmental disability (41.7 per cent). This is almost twice the level of 'vulnerability' reported in local area data and twice the level of disability reported in our study. These findings therefore reflected the experiences of a larger number of CALD families who were accessing early *intervention* services in addition to preventive healthcare.

The study reported that despite the GP being regarded as a "gatekeeper" to a complex "ever-changing" referral system, described as "overwhelming" to CALD families, in the event of a developmental concern, GPs were still viewed as the "first port of call" by both parents and early childhood services (Woolfenden et al., 2015). Many barriers to accessing care for CALD communities were shared in the two studies and some additional insights were gained:

1. Amongst CALD parents, both studies found that the child's age influenced whether the family used CFHN services, but disengagement seemed to occur from 6 months of age, earlier than in my study.
2. Access to a GP proficient in the parents' first language, removed substantial barriers for CALD parents in both studies. Woolfenden et al. also explored the role of interpreters and found that while they could facilitate care, in some cases, when they lacked sensitivity or appeared intimidating, this detracted a parent from accessing care. Woolfenden also commented on a gender imbalance in the proficiency of English that usually favoured the father, who would interpret and filter the information the mother received. This sometimes extended to the father having the power to 'veto' service access.
3. The 'cultural clash' of conflicting knowledge of childcare practices that I found diminished satisfaction and engagement amongst our CALD families, was not highlighted in the

Woolfenden study, but cultural and community attitudes remained major barriers. A child with a disability represented a source of shame and stigma to CALD families and, compounded with a lack of knowledge, significantly impacted access to disability services. In addition, some families were reluctant to use early childhood education because this was a role families were expected to uphold.

4. The acquisition of social relationships that enabled parents to gain knowledge of both child services and child development (through comparison with others) was common to both studies, as was the expectation that childcare agencies would help with monitoring their child's progress. Woolfenden, however, discovered that social isolation was a significant issue for CALD-mothers, and even when parents worked, they lacked knowledge of support and early intervention services because in those situations grandparents often became the full-time carers of children.
5. Financial barriers, short consultation times in general practice, and long waiting lists for public services were barriers common to both studies. The competing priorities of family-life that were signalled as problematic amongst parents in our studies were compounded by the necessity for some families in the Woolfenden study, for both parents to work, often long hours.

Woolfenden concluded that opportunities for early intervention were missed due to barriers at all levels of Andersen's Health Service Model. Solutions similarly proposed professional development to include culturally sensitive communication skills and the formulation of clear referral pathways with strong collaboration between GPs and CFHNs. In addition, Woolfenden et al. advocated for increased numbers of multicultural workers to liaise between CALD families and early intervention services (Woolfenden et al., 2015). Woolfenden's study underscores the importance of replicating research in other jurisdictions, obtaining a variety of perspectives and building upon the research of other groups.

Conclusions – Parents study

The findings from our parents' study can be incorporated into the development of an intervention designed to increase preventive healthcare delivery from general practice. Significantly, from the perspective of general practice, parents often placed preventive healthcare as a low-priority and behind the acute healthcare needs of their children, due to health-prioritising and costs. Additionally, except for immunisations, they did not know that general practice had any stake in preventive healthcare for young children. I can conclude from my research, and that of others (Moore & Grove, 2008; Woolfenden et al., 2015), that young children are missing out on opportunities for identification of health and developmental problems and therefore, early intervention. The HKC represented a 'golden' opportunity to enlighten families and improve young children's prospects.

Aside from the single chance for intervention presented by the HKC, are the episodes at which parents access vaccination services for their children. The timing of immunisations is dependent on the type and combination of vaccinations and the need to obtain immunity as soon as physiologically possible in the child's life. This means that primary vaccinations are generally completed in the first 12-18 months of the child's life. The age at which the HKC was offered coincided with the remaining 'boosters' administered 'pre-school' (after 3.5 years and before 5 years). It is during this immunisation-free gap – between 18 months and 3.5 years – that vision, speech, social and cognitive development make rapid progress, so that differences between children become *more* apparent as age advances. New, and often challenging, behaviours present and parents must find a way to balance the child's individuality and freedom of expression against society's expectations and constraints.

The preschool period is also a crucial time for dietary patterns and tastes to be established. The gut biome, pre- and probiotics, and predisposition to adult and childhood obesity is the focus of an expanding body of research that is investigating the association between gut microbiota and energy homeostasis (Luoto, Collado, Salminen, & Isolauri, 2013), as well as childhood allergies and eczema (Kukkonen et al., 2007; Zhang et al., 2016). These advances suggest an increasing role for education and intervention in infancy and early childhood, with the potential for considerable health gains. The

challenge lies in how best to streamline the delivery of preventive healthcare from the perspective of both families and practitioners.

Implications of the parent study for the design of a practice-based intervention

From this report of parents' experience obtaining preventive healthcare on behalf of their children, I can conclude that specific elements should be included in a practice based intervention. First, education and training of GPs and PNs needs to incorporate increasing the awareness of cultural beliefs and barriers specific to CALD communities. Second, an open communication style, that promotes discourse from the waiting room through to the consultation room, could be developed using parent questionnaires as part of 'structured developmental surveillance'. These would ideally be handed out to parents as they enter the waiting room by reception staff, along with the rehearsed script: "Our doctors and nurses find these questionnaires particularly helpful when looking after the health and development of your child. Could you complete this whilst you wait to be called? If you prefer one of our staff can go through it with you" –to promote parents' knowledge of GPs' interest in child preventive health. Third, clinic routines that ensure that every child's height and weight is measured (every six months) would send a strong message to parents that this is an important aspect of healthcare and would help to integrate prevention into 'sick-child' consultations. Fourth, gaining permission from parents to liaise and share information with CFHNs, early-childhood educators and child-care workers (e.g. referrals, shared IT systems and professional development opportunities) would appear to be acceptable to parents based on our research, and would augment continuity to healthcare. Finally, where possible, low cost, or no 'out-of-pocket' costs, for preventive services, would be highly recommended as the cost of services was a barrier to families across all socio-demographic groups.

Practitioners' study – Methodological learnings

Recruitment

Recruitment for practitioners took place through the regional Divisions of General Practice (Figure 1) located in the same areas as the parent study. Advertisements to join the study were placed in electronic and hard-copy newsletters that routinely went out to practices (practice managers and GPs). After two weeks, I made follow-up phone calls to PNs or managers (using publically available contact lists) and faxed reminders directly to practices. In all of these interactions I introduced myself as a GP and a researcher, pursuing a study of preventive healthcare for young children and the HKC. This latter method was particularly successful in obtaining expressions of interest and subsequent commitment to join the study. Recruitment initiatives yielded 36 expressions of interest from practice nurses and 32 expressions of interest from GPs.

Despite high levels of interest I encountered difficulties maintaining adequate numbers in the focus groups and had to take active measures to maintain at least six participants per group: In each of the GP focus groups I called on practitioners from my own practice to maintain group numbers. This was discussed and determined as acceptable to the study aims because:

- my GP practice was within one of the research areas
- although HKCs were offered from my practice, demand for services seemed low
- the personal views of independent practitioners regarding HKCs were not known to me before the focus group took place.

This maintained adequate numbers in all of the groups except for the Westgate PN group (n=5). No new insights were obtained during this study (data saturation) and as this was the last scheduled group no additional groups were organised.

Range of experience delivering HKCs

It became apparent with the opening questions that, in each group, there were wide variations in the number of services practitioners had provided. For example, in one focus group, one practitioner identified children opportunistically from vaccination clinics (run three times a week) and squeezed HKCs in at every opportunity. A second practitioner described how they had ‘trained up’ the PN to do a HKC with every vaccination of a 4 year old. Another GP, who was assigned to a community health centre where MCHNs were stationed down the corridor, decided against doing HKCs (having done just one) because he believed the MCHNs did a more thorough job. A fourth GP (still in the same focus group) had gone through the items on the HKC-checklist for some children, but her practice did not use the assigned Medicare item number, whilst a fifth applied opportunistic preventive care and believed her local population, being highly educated, did not need HKCs. The final practitioner, in this group, worked in a practice that offered the service but had not administered the HKC, herself.

Similar variability was found amongst the nurses. In one focus group, two of six participants described how they operated independent clinics of HKCs. These nurses were highly organised, sent letters of invitation out to families and had built up considerable knowledge and resources to support the outcomes of the checks. For example, in the event that a speech disorder was picked up, one nurse had a list of all private and public speech therapists in the local area, including information about out-of-pocket costs and current waiting times. It is pertinent that the area these nurses worked (Dandenong – low socio-economic, high CALD) included a high proportion of recent migrants (who often required catch-up immunisations) and a ‘growth corridor’ that attracted large proportions of young families. The AEDC indicates two to three times the average levels of vulnerability in this area with ‘communication’ and ‘social development’ particular areas of difficulty (Australian Early Development Census, 2015). Therefore I would expect this population to have higher levels of need. Nurses in this focus group also described increased demand for HKCs following the government ‘incentive’ that linked family tax benefits to completion of a health check (Department of Human Services, 2011).

I did not gather specific data from participants regarding the number of HKCs they had delivered, but it is possible that ‘social desirability’ may have made some participants reticent to reveal the fact that they were not offering HKC services. This is validated by the order of dialogue in one of the PN focus groups where discussion initially focussed on the two participants who ran their own nurse-led HKC-clinics. Other PNs revealed they had not done many (if any) HKCs much later in the discourse. We could have attempted to divide groups according to high and low HKC-rate providers, but the focus groups were sufficiently long in duration to gather the range of experiences.

Theoretical Domains Framework

I chose the Theoretical Domains Framework (TDF) to determine the barriers to the implementation of HKCs and preventive healthcare for children because it provided an accessible methodology that fleshed out the steps proposed in the MRC Framework (Michie et al., 2005). Unlike ‘true’ theories, according to Atkins et al. (2017) the TDF should be regarded as a *“theoretical lens- through which the cognitive, social, emotional and environmental behavioural effects can be viewed”*. Its comprehensive coverage of the potential mediators of behaviour change with the ability to capture beliefs (e.g. emotional factors) beyond ‘rational or cognitive processes’ (Francis, O’Connor, & Curran, 2012) provided me, as a novice researcher, with some surety that nothing would be omitted and that all accounts of behaviour would be considered in my analysis. The TDF has been cited in more than 160 publications (search on Medline and World of Science Nov 14 2016) including at least five intervention studies aimed at a variety of professionals working in infant and child health (Elouafkaoui et al., 2015; Gnich et al., 2015; Lazure et al., 2014; Sakzewski, Ziviani, & Boyd, 2014). This provided additional evidence of the utility of the TDF and its contribution to implementation research. In my research with practitioners I used the original 12 domains (Michie et al., 2005) and adapted the questionnaire that accompanied the framework to provide a list of prompts that guided the six focus group discussions (Appendix 5).

The domains of the TDF collapse into a simpler behavioural model known as “COM-B” that encapsulates three tenets of behaviour : Capability; Opportunity and Motivation (Michie, van Stralen,

& West, 2011). Given sufficient motivation towards the volition of a behaviour, capability and opportunity are essential prerequisites to generate it (Nilsen, 2015). The TDF is a more detailed tool than COM-B and I used both the TDF and COM-B to analyse the results from our research with practitioners.

RESEARCH

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Barriers and enablers to delivery of the Healthy Kids Check: an analysis informed by the Theoretical Domains Framework and COM-B model

Karyn E Alexander^{1*}, Bianca Brijnath² and Danielle Mazza³

Abstract

Background: More than a fifth of Australian children arrive at school developmentally vulnerable. To counteract this, the Healthy Kids Check (HKC), a one-off health assessment aimed at preschool children, was introduced in 2008 into Australian general practice. Delivery of services has, however, remained low. The Theoretical Domains Framework, which provides a method to understand behaviours theoretically, can be condensed into three core components: capability, opportunity and motivation, and the COM-B model. Utilising this system, this study aimed to determine the barriers and enablers to delivery of the HKC, to inform the design of an intervention to promote provision of HKC services in Australian general practice.

Methods: Data from 6 focus group discussions with 40 practitioners from general practices in socio-culturally diverse areas of Melbourne, Victoria, were analysed using thematic analysis.

Results: Many practitioners expressed uncertainty regarding their capabilities and the practicalities of delivering HKCs, but in some cases HKCs had acted as a catalyst for professional development. Key connections between immunisation services and delivery of HKCs prompted practices to have systems of recall and reminder in place. Standardisation of methods for developmental assessment and streamlined referral pathways affected practitioners' confidence and motivation to perform HKCs.

Conclusion: Application of a systematic framework effectively demonstrated how a number of behaviours could be targeted to increase delivery of HKCs. Interventions need to target practice systems, the support of office staff and referral options, as well as practitioners' training. Many behavioural changes could be applied through a single intervention programme delivered by the primary healthcare organisations charged with local healthcare needs (Medicare Locals) providing vital links between general practice, community and the health of young children.

Background

Since 2007, significant reforms in Australia's health and hospital system have shifted their focus towards prevention and a multi-sector government response, in a bid to improve healthcare and curtail the costs associated with an ageing population [1]. Local primary care organisations, known as Medicare Locals, are charged with providing the infrastructure to support identification of risk and implementation of preventive health programmes [2]. Outside the health system, educational reforms target

early childhood and address intergenerational disadvantage [3]. These initiatives seek to improve health in early childhood, for despite Australia having one of the highest life expectancies world-wide, under-5 morbidity and mortality remains disproportionately high; 37% of Australian children suffer chronic health conditions and around 7% have a disability [4]. Additionally, 42% of 5-year-olds suffer dental caries [5], and more than a fifth of Australian children arrive at school developmentally vulnerable [6].

Although a review of the evidence for child health surveillance^a has found little evidence for effectiveness (principally due to a lack of clinical guidelines), the report concluded that there was a need to rethink how child surveillance was conducted [7]. Australia has a system of publically funded child health surveillance visits provided

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is available at the end of the article

by Maternal and Child Health Nurses (MCHN) through local government. Delivery of services varies considerably state-wide, but in the state of Victoria – where this study was conducted – services engage more than 90% of families in a child's first year. However, contact diminishes as the child gets older, so that by 3 ½ years of age, less than 60% of children complete health surveillance visits [8]. In contrast, general practice services are delivered from predominantly privately owned clinics. Rebates for services – inclusive of some preventive health assessments – are available from the national insurer 'Medicare' with the intent to secure universal access to subsidised primary care services. Consequently, more than 80% of the Australian population visit a general practitioner (GP) each year [9].

To increase opportunities for preventive health with young children, in 2008 'The Healthy Kids Check' (HKC) [10], a one-off health assessment aimed at preschool children, was introduced into general practice, where 12% of GP-patient contacts are with children [11]. Administered by GPs and general practice nurses (PNs), the HKC comprises an assessment of growth and development, and offers health promotion opportunities (Table 1) on the occasion of a child's preschool immunisations. Despite a Medicare rebate being applicable, uptake has been lower than anticipated, with only 16% of 4-year-olds completing a HKC in the first year. The state of Victoria ranked sixth out of seven states in terms of proportions of children receiving HKC services in 2012 [12]. Since its introduction, there have been no empirical studies examining the factors influencing uptake of the HKC in general practice.

Barriers to the consistent delivery of preventive care for young children, prior to the introduction of the HKC, included insufficient time, poor financial reward, and a lack of community resources (*e.g.*, information and referral services) [13]. Studies from the United States (US) have identified practitioner barriers to the US system of 'well-child care.' These include knowledge gaps, lack of confidence using validated tools [14,15], insufficient understanding of early intervention [16] (which hinders detection of developmental delays), inadequate office staff and poor remuneration [12]. For parents in Australia, our previous research showed that parent decision-making around

accessing preventive care for their children was influenced by the birth order of the child, cultural health beliefs, healthcare costs, and limited knowledge about early intervention [17].

Therefore, for an increase in HKC services to occur, the behaviour change processes of several interacting groups of people, including parents and healthcare providers, operating at various organisational levels, needs to be considered. The development of such a 'complex intervention' must be underpinned by local evidence and rigorous psychological theoretical constructs, to both facilitate behaviour change and provide an explanation for the mechanism of change. The use of a theoretical framework in the design and evaluation of interventions has been increasingly emphasised by implementation researchers [18-20]. Guidance from the United Kingdom's Medical Research Council proposes that where psychological theory underpins the iterative processes involved in designing a complex intervention, innovation is more likely to succeed [21].

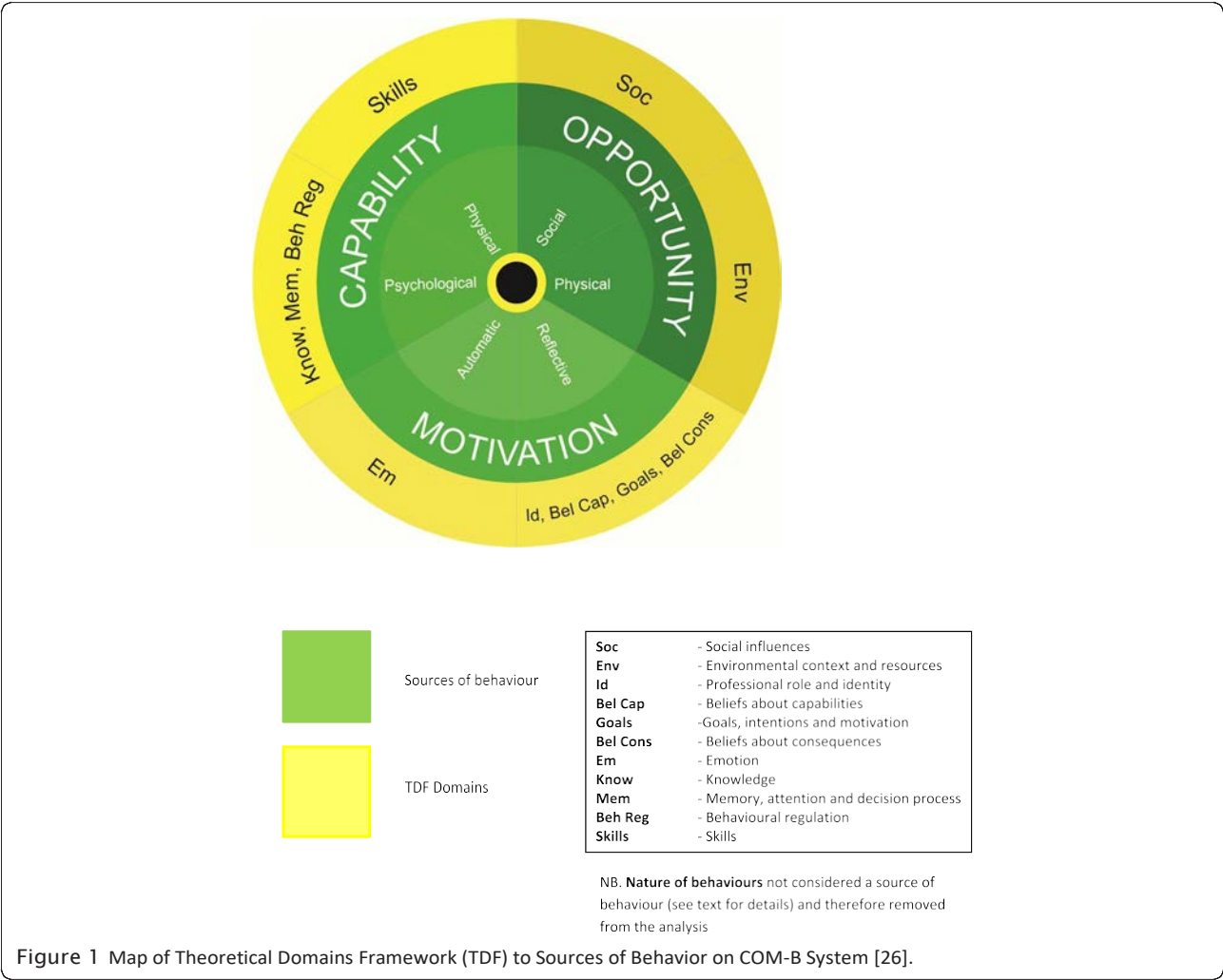
The Theoretical Domains Framework (TDF) is a method established to understand behaviours theoretically so that processes can be effectively targeted for change [19]. The original TDF^b consisted of 12 domains and was developed by consensus from a combination of 33 psychological and organisational theories to provide a guide towards implementing evidence-based practice (Table 2) [19]. This approach seeks to make psychological theory more accessible to health service researchers. The TDF has been widely implemented across a variety of settings [22] and includes analysis of preventive health including preconception care [23], hand hygiene behaviours in a hospital setting [24], and human papilloma virus counselling in primary care [25]. The 12 domains of the TDF can be condensed into three core components: capability, opportunity and motivation (Figure 1) [26]. The COM-B model demonstrates that human behaviour (B) results from the interaction between personal physical and psychological capabilities (C), to utilise social and environmental opportunities (O) via motivators (M) that are reflective (thinking with the head) or automatic (emotional-'thinking' with the heart).

Table 1 Components of the healthy kids check (2008)

Mandatory	Non-mandatory
Height	Discuss eating habits
Weight	Discuss physical activity
Eyesight	Speech and language development
Hearing	Fine motor skills
Oral health	Gross motor skills
Question toilet habits	Behaviour and mood
Note allergies	Other examinations as necessary

Table 2 The theoretical domains framework (Michie 2005) [19]

DOMAINS	
Knowledge	Memory, Attention and Decision processes
Skills	Environmental Context and Resources
Social/professional role and identity	Social Influences
Beliefs about capabilities	Emotion
Beliefs about consequences	Behavioural Regulation
Motivation and goals	Nature of the Behaviours



Utilising the TDF and COM-B, the aims of the present study were to determine the barriers and enablers to delivery of the HKC, and to inform the design of an intervention to promote provision of HKC services, in Australian general practice.

Method

Design

Focus group discussions with GPs and PNs were undertaken to explore their knowledge-behaviour gaps. Group dynamics were viewed as more likely than individual interviews to reveal attitudes and experiences, and the underlying reasons for specific behaviours [27].

Sample

Three groups of GPs and three groups of PNs (total 40 practitioners) were recruited from three socio-culturally diverse urban areas of Melbourne, Victoria, broadly categorised as high income (Bayside), low income (Westgate), and culturally diverse (Dandenong).

The study was advertised by newsletter and invitations were faxed to clinics served by Medicare Locals in these areas. To increase responses, phone calls were made to individual practice managers and PNs by one of the researchers (KA), and participants could recommend other practitioners (snowballing), with a limit of one GP and one PN from each clinic.

Procedure

An interview guide based on the TDF was designed to prompt focus group discussions (Table 3). To avoid 'group hierarchies', focus groups were divided by practitioner (except for one attendee, a practice nurse, who opted to attend the GP group) (Table 4). Focus groups took place between June 2011 and October 2011 (three years following introduction of the HKC), lasted approximately 90 minutes and were facilitated by the first two authors (who declared their positions), one a GP, trained in qualitative research methods, the other, an experienced qualitative researcher. A voucher valued at \$200 for GPs and \$80 for

Table 3 Prompts for focus groups according to Michie's theoretical domains

Theoretical domains	Examples of interview prompts
Knowledge	Do you know about the mandatory and non-mandatory components of HKCs? Do you know about the RACGP guidelines for child preventive health?
Skills	How have you learned how to do a HKC? Have you had any training for HKCs? Which components of the HKC do you perform? Are there any specific areas of difficulty? One of the non-mandatory components is questioning the social and emotional behaviour. Do you ask about that? Can you assess the social and emotional well-being of a three-year-old? What do you think about measuring children and calculating BMI?
Social/professional role	Who do you think should be doing HKCs? How do they fit with the checks done by MCHNs? Do you think general practitioners have a role in preventive health in general? Why did you set up HKCs in your practice?
Beliefs about capabilities	How good are we at picking up problems in young children? How easy or difficult is it to do a HKC? Do you think that you've got the skills (to do a HKC)? Do you fear that you might miss something? How confident are you that you can pick up a problem? How confident are you with the assessment of social and emotional wellbeing
Beliefs about consequences	Do you think HKCs are worthwhile? Do you think they should be scrapped? In your experience of doing health checks with this age group, did you come across problems in your population? What do you think about the evidence base behind the HKC? How do you think parents view the HKC? Has anyone refused a check?
Motivation and goals	Why do you do HKCs? Why don't you do HKCs?
Memory, attention and decision processes	Is performing a HKC something you usually do? Do you use any prompts? Has anyone decided NOT to do a HKC?
Environmental context and resources	Do you have any systems in place to run a HKC? Do you have the equipment? What do you use to help with a HKC? Is anyone using any questionnaires or tools with a Healthy Kids Check? Is there anything specific about WHERE you practice-your population group?
Social influences	Has anyone used any reminders or invitations for HKCs or do you just wait for people to ask? What do you think about the policy change that links the HKC with the Family Tax Benefits?
Emotion	How do you feel about health assessments with children? Does it give you any particular feelings or emotions?
Behavioural regulation	Are there procedures or ways of working that encourage you to do HKCs?
Nature of the behaviours	What do you currently do about HKCs What about weighing an overweight child? How do you approach an overweight child?

HKC: Healthy Kids Check; RACGP: Royal Australian College of GPs; MCHN: Maternal and Child Health Nurse.

PNs was given to each practitioner in appreciation of their time. This incentive discrepancy reflects differences in average earnings between practitioner groups and known difficulties with recruiting practitioners to research projects [28]. Focus groups were audio-recorded and later transcribed for analysis. A report was emailed to each participant to solicit feedback. Ethics approval was obtained

from Monash University, and all participants provided written informed consent.

Analysis

Data were analysed by applying categories from the TDF in a recursive process that followed the customary steps of thematic analysis [29]. Specifically, after reading through

Table 4 Focus groups according to practitioner and area

Name and description of area of Melbourne	Participant numbers in GP focus groups (Total =22)	Participant numbers in practice nurse focus groups (Total =18) (all female)
Bayside upper socio-economic	6 (3 female 3 male)	6
Dandenong lower socio-economic Culturally and linguistically diverse	9 + 1 practice nurse (6 female 4 male)	6
Westgate lower socio-economic	7 (4 female 3 male)	5

the entire dataset, the first two authors independently coded the data from each transcript and assigned initial 'code names,' then collaborated and discussed choices, with a third researcher available to resolve any differences in opinion. Data were imported into NVivo 8 [30] and de-identified. After agreement had been reached, an additional step was taken to match code names to themes represented by the 'domains' within the TDF. This required the researchers to re-read data within the codes, then allocate the codes to the appropriate domains. This sometimes meant that the data coded under one code name was categorised into two or three different domains within the TDF. All codes could be applied to at least one domain. From there the domains were mapped to the COM-B system (Table 5).

There were two domains of the TDF that we did not match any data to: the 'Emotional/Automatic' aspects of 'Motivation' and the 'Nature of behaviours'. With regard to the former domain, although specific questions had been asked about emotions felt by practitioners when dealing with young children and health screening, responses were captured under the theme 'GP attitudes and feelings'. This was assigned to the domain, 'Professional role and identity', and ultimately mapped to 'Motivation' in the COM-B model. The domain 'Nature of behaviours', part of the original list of domains within the Framework, could not be assigned to the COM-B model because whilst it described context (current practice), it did not provide a source of behaviour. This domain was subsequently removed in a review of the Framework which tested its validity with a second group of behavioural change experts [31].

Results

Focus group captured a diverse range of practitioner experiences with the HKC, in each study area: some had not, as yet, provided a single HKC, others delivered a few checks occasionally, and some practices regularly booked HKC appointments or extended to provide entire clinics of HKC services. The study found that,

overall, practitioners reacted positively towards providing preventive healthcare to young children. They conceptualised this in terms of the provision of immunisation services and HKCs and, to a lesser extent, opportunistic growth and developmental assessments during 'sick-child' consultations. Below we describe how our data aligns within the TDF and COM-B model (Table 6).

Capability

Skills, knowledge, memory, attention and decision processes
Practitioners' self-assessment of their capabilities to screen the health of young children varied, but all practitioners held reservations about particular components of the HKC. GPs generally thought that they had sufficient skills and knowledge, but when challenged to consider each component of the HKC, they were uncertain about how to test the vision, hearing and social-emotional health of this age group, and admitted to difficulties recalling child developmental stages. PNs were not prepared to conduct HKCs until they had received specific training and expressed concerns that they risked antagonising parents if they suggested a child's development deviated from normal, particularly with behavioural problems, social and emotional difficulties, weight and body mass index:

I don't think I'm equipped to assess a four-year-old enough, even though I have had two [children]. I don't feel comfortable sometimes ... talking to parents if there's issues. It's quite daunting... parents don't like to hear that something's wrong with their child.
(PN1 Dandenong).

How do you, if you've got an overweight 3 ½-year-old, if you've not got the training? How do you deal with that without really offending the parent?
(PN1 Bayside).

Behavioural regulation

Practitioners perceived that there could be a wide variability in the quality of HKCs and thought they should be standardised for greater consistency across practices and between practitioners. Participants compared the structure of primary healthcare in Australia, the United Kingdom and New Zealand; they believed the fact that individual practices were not held to account for the public health of a local population called for greater regulation of clinical behaviours.

It's not like in England where you have a list and you know who're your customers ... We know patients float around here, there and everywhere, especially with kids ... if you're going to do it properly you do it in a programmed, reproducible, managed [way].
(GP1 Bayside).

Table 5 Mapping of codes to themes from Theoretical Domains Framework (TDF) and COM-B system

Code assigned directly to transcripts from focus groups	Themes from TDF	COM-B system		
Rationale for doing HKCs**	Knowledge	Psychological CAPABILITY		
Memory-remembering todo HKCs/preventive	Memory, attention and decision processes			
Growth and weight component of HKC**				
Systems and prompts**	Behavioural regulation			
Structure-logistics (how the clinic is run)***				
Tax incentive issues prompting HKC				
Standardisation of HKCs or components within				
Medicare and item numbers				
Immunisation or vaccination issues				
Financial barriers (for practitioners)			Skills	Physical CAPABILITY
Dental component of HKC**				
Eye or vision component of HKC**				
Hearing component of HKC**	Social influences	Social OPPORTUNITY		
Child support network, <i>e.g.</i> , childcare & kinder**				
Parent concern				
Role of MCHN				
Population screening				
Socio-cultural issues				
Resource allocation as equity/ethical concern**				
Systems and prompts for HKCs**			Environmental context and resources	Physical OPPORTUNITY
Structure-opportunistic (appointments)**				
Structure-logistics (how the clinic is run)***				
Structure- IT				
Space and resources including 'Purple Book'	Beliefs about capabilities	MOTIVATION- Reflective		
Time barrier				
Dental component of HKC**				
Eye or vision component of HKC**				
Social & emotional health component of HKC***				
GP knowledge and skills**				
PN attitude and feelings**				
PN knowledge and skills				
Role of the PN**			Professional role and identity	
PN attitude and feelings**				
Role of the PN**				
GP attitude and feelings				
Role of GP				
Social & emotional health component of HKC***				
Child support network, <i>e.g.</i> , childcare & kinder**				
Motivation (to do HKC or preventive care)				
Preventive healthcare	Motivation and goals			
Rationale for doing HKCs**				
Outcomes from HKCs	Beliefs about consequences			
Early intervention				

Table 5 Mapping of codes to themes from Theoretical Domains Framework (TDF) and COM-B system (Continued)

Bureaucracy and 'red tape' barriers		
Social & emotional health component of HKC***		
Growth and weight component of HKC**		
Resource allocation as equity/ethical concern**		MOTIVATION-Automatic
Hearing component of HKC**	Nature of behaviours	Not included in COM-B model but each code is a duplicate
GP knowledge and skills**		
Structure-logistics (how the clinic is run)***		
Structure-opportunistic (appointments)**		

mapped to two different themes from TDF; *mapped to three different themes from TDF.

Using specific screening tools was put forward as one solution to counter variability in practice and regulating standards.

Give us the tool ...a tool that everybody can use. The same tool, because if we're all doing it separately then where's the base to start from? (PN2 Dandenong).

Opportunity

Practitioners who had the capabilities to conduct HKCs were either encouraged or deterred from performing HKCs according to conditions established by the physical and social environment, within and external to their clinics. These shaped the opportunities for establishing systems and conducting HKCs from their practices.

Environmental context and resources

Practitioners believed that computerised prompts worked to promote the delivery of HKCs but recalled many physical barriers including cost and difficulty accessing screening tools. For example, one PN had tried to source eye charts and was told by the company that the charts were only available to government employed MCHN services. Lack of supportive health literature, especially the 'demise' of the 'Purple Book', was also a source of much discussion. The purple-coloured booklet, entitled 'Get Set 4 Life - Habits for Healthy Kids', was initially allocated by the national government to support health promotion aspects of the HKC. However, by 2011, hard copies had run out and the book's content moved online. Delivered in a child-friendly format containing cartoon characters and stickers, the book was viewed positively by practitioners because 'It makes you feel like you've done something' (GP1 Westgate).

PNs stated that the space to accommodate HKC examinations was inadequate at times. When an entire family attended for one child to have a HKC, conditions became cramped, and practitioners faced additional pressures as siblings quickly became bored and restless. PNs said such experiences undermined their professional image and left them feeling dissatisfied.

They're often with other siblings and they've already been at the surgery half an hour, and by the end of it you're feeling quite pressured for time and you can tell everyone is well and truly sick of this. (PN1 Westgate).

Social influences

Social structures within the practice influenced the delivery of HKCs, and two factors appeared essential: provision of vaccination services and employment of a PN at the practice. Where clinic protocols related vaccination services to the HKC, designated staff were often assigned to manage a system of invitations, recalls and reminders.

We send our recalls every couple of months, and we do have really good results from that. We have most people come back when they get their immunisations. (PN2 Westgate).

In these situations, PNs were 'trained up' to conduct HKCs, so that demand could be fulfilled:

They [GPs] want practice nurses to come in and drive all these things because they haven't got the time. (PN2 Bayside).

Additionally, where a practice had a practitioner who 'championed' the promotion of preventive healthcare for young children, the clinic's capacity to deliver HKCs increased. GPs who had a special interest in child health, for example, made particular efforts to accommodate HKCs or assessed child development opportunistically with vaccination consultations. The professional mix in the practice also influenced its provision. If a paediatrician or MCHN consulted from the same office space, practitioners believed this promoted the overall delivery of child preventive services, and they supported these shared care models.

In the broader social environment, recent fiscal policy changes were noted to influence parents' uptake of HKCs. In 2011, the federal government determined that for a

Table 6 Summary of the evidence, application of TDF and COM-B and proposed interventions

Evidence	TDF	COM-B	Proposed intervention
	Capability		
GPs did not always know how to assess aspects of development	Knowledge	Capability-Psychological	Education and training which incorporates:
PNs did not know how to do HKCs (until they had received training)			Knowledge about “Early Intervention”
GPs did not always <i>remember</i> how to assess overall development	Memory		Physical examination techniques
GPs conducting HKCs were uncertain about which tests to use and how to do them	Physical skills	Capability-Physical	Structured developmental assessment and evidence behind this Interpersonal skills training
PNs wanted training on skills required for HKCs			Tools appropriate to primary care
PNs did not know how to manage parent reactions to possibility of abnormality in child's development.	Interpersonal skills	Capability-Psychological	
Variable quality of HKCs	Behavioural regulation		
	Opportunity		
Equipment barriers	Environmental context and resources	Physical opportunity	Funding for equipment and tools, including information technology
Supportive health promotion brochures			
Space in clinic to accommodate the HKC examinations			Provision of health promotion literature
Medical contact with children especially vaccinations	Social influences	Social opportunity	Education and training which incorporates: Practice structure
Employing a PN			Office systems including recall and reminder
Having staff responsible for managing a recall system			Tools appropriate for use in general practice (time saving)
Having a “HKC Champion”			
The professional mix in the practice			
Competing interests of practice population healthcare needs			
Practitioners had insufficient time			
“Healthy Start for School”-Tax incentive to complete HKC			Strengthen government support for delivery of early childhood intervention across services
Increase in Medicare rebate			
Belief that general practice competes with other service providers to provide HKCs			
	Motivation		
Belief that MCHNs have ownership and expertise in preventive healthcare for young children	Professional role and identity	Reflective motivation	Education and training which address capability and professional roles with task delegation
GPs find process tedious and place HKCs low priority			
Alternative model of developmental assessment with early childhood educators playing primary role			
Developing the role of the PN in Australian general practice	Professional role and identity & Beliefs about capabilities		

Table 6 Summary of the evidence, application of TDF and COM-B and proposed interventions (Continued)

PNs expressed low levels of self-confidence with some of the components of the HKC		
PNs preferred clear boundaries when delivering HKCs		
PN personal drive for professional development	Goals, intentions and motivation & Positive beliefs about consequences	Opportunity to build capacity in early childhood development involving other professionals
HKCs used by some practitioners to develop professional expertise		
PNs more confident about their abilities were more satisfied with outcomes		Centralisation and dissemination of information about community resources
Outcomes and referral pathways are important to practitioners beliefs		
GPs expressed low confidence with evidence behind HKCs	Negative beliefs about consequences	
Belief that timing of HKC is too late for early intervention		

family to receive a particular tax-benefit, a health check had to be obtained for each child turning four years of age [32] (from a MCHN or GP). Practitioners generally agreed with this policy, and believed it encouraged the assessment of more vulnerable children.

Discussion about how increases in government rebates for HKCs (as they were brought into line with other health assessments and rebated according to time spent with the patient) had encouraged some practitioner's efforts towards establishing services, also revealed perceptions of market competition:

(Laughing) The practice nurses in my practice at the beginning of this year were saying, 'Oh, maternal and child health nurses, they're in the best position to do it.' We're saying, 'No, no we get money for this. We need to be doing this!' (GP1 Dandenong)

The competing priorities of general practice: chronic disease management, health assessments for other population groups (e.g., aged-care assessments) and acute care needs, created time pressures, and highlighted social environmental barriers still remaining for practitioners.

Motivation

The evolution of respective practitioner roles around providing HKCs tied in with beliefs about capabilities and beliefs about the outcomes resulting from provision of preventive healthcare to young children. 'Motivation' is a key factor to understanding the uptake of HKCs.

General practitioners – professional role and identity

Many GPs struggled to understand why HKCs had been introduced, believing they acted as a 'safety net' to 'catch'

those children who had missed out on MCHN services (Bayside GP discussion). They did not perceive themselves as being active participants in childhood surveillance, and found the HKC procedure to be tedious.

I didn't do medicine to do four-year-old health checks ... You could sit all day and do four-year-old checks, over-75 checks, over-45, you know... You want to see the acute illnesses. (GP2 Bayside)

Most GPs thought that the role of 'screening' young children belonged to MCHNs. Although they acknowledged they had a role to play in preventive health in general, one-off health assessments of preschool children were given a low priority, and their capacity was limited by competing and more urgent demands on their time.

If you give the GP's so much prevention, because it's the hugest, biggest, fattest end of the iceberg ... it takes up so much time you don't actually get to the other stuff and you have people dying at your door because they can't get in. (GP1 Westgate)

Several practitioners proposed an alternative model of childhood surveillance that encompassed a secondary role for GPs, whereby identified problems could be referred to the GP for further assessment. They believed developmental problems would be more easily identified in group situations where children could be assessed against their peers. They targeted kindergarten teachers as being ideally placed to assess child development because they already had a role appraising children's 'school-readiness'.

Practice nurses – professional role and identity and beliefs about capabilities

PNs thought that their role in Australian general practice was still in its infancy (compared with places like the UK), and they talked about establishing a foothold in general practice and striving to project a professional image. They also believed that the provision of HKCs was the remit of the MCHN. The perception in one group discussion was that MCHNs ‘got their nose out of joint’ (PN3 Bayside) when HKCs were introduced, so that they had ‘retaliated’ with a radio advertising campaign. This inter-professional conflict created anxiety for PNs, and they conveyed low levels of self-confidence about their capacity to provide child health checks.

Given that the infant welfare centres do have the expertise, if I was a mother I know which one I’d rather go. (PN4 Bayside)

Goals, intentions and motivation and positive beliefs about consequences

Nevertheless, PNs also perceived that GPs wanted them to ‘drive’ the delivery of HKCs and, once training was offered and clear professional boundaries had been established, the opportunity to advance their professional standing motivated them towards providing services.

I remember saying at the beginning, ‘I don’t want to do them’ because I don’t know anything about them ... and then they offered the education and I thought, ‘It’s a really good education, it adds to ... my repertoire ... my knowledge base.’ (PN3 Bayside)

Whilst the majority of practitioners were slow to embrace HKCs, a few readily used the provision of HKCs to support their personal professional development. Two GPs (one a GP in Bayside, the other in Westgate focus group), who had additional qualifications in paediatrics, sought children from vaccination consultations to opportunistically conduct developmental assessments or HKCs, and two PNs were independently conducting HKC ‘clinics’, without GPs, and had established clear referral pathways. These PNs were much more confident about their abilities and expressed more satisfaction that the problems they identified validated doing HKCs.

We have quite a few that go on for speech therapy or we have them on care plans because they’ve got learning difficulties or things like that ... they’re able to access better services ... Not everybody needs it ... but the one or two that you do pick up that can get services, it makes it all worthwhile. (PN2 Dandenong)

Of interest was the fact that both of these PNs participated in the focus group in the Dandenong region, an area which serves a large migrant population of low socioeconomic status.

Negative beliefs about consequences

Many practitioners, however, voiced concerns about the overall value of HKCs and low levels of evidence for childhood surveillance and screening.

[Chlamydia and bowel cancer screening] have an evidence-base to [them]... And then we have this healthy four-year-old test – but what’s the evidence base for this? (GP1 Dandenong focus group)

Practitioners recognised that ‘early intervention’ was important but felt defeated by the fact that the HKC was linked to immunisations given at four years of age, an age they considered too late for effective intervention before the start of school. Where services were difficult to access or where there was less certainty about what to do for ‘test-positive-children,’ practitioners were further disinclined to carry out HKCs. As one GP said, ‘So you find something wrong, but what’s the management after that?’ (GP2 Westgate). The ‘can of worms’ analogy captured their reticence and the opening up of a myriad of difficulties, particularly with social-emotional and behavioural health assessments. Some practitioners thought that particular parent groups would feel judged:

(GP2) Who will talk about this social and emotional child? Because they will be constantly thinking about the child being taken away from them, I don’t think they will even be keen to discuss it.

(GP3) And this is a huge can of worms if we start digging for emotional and [social health] (Dandenong focus group)

Discussion

We have applied a systematic process to our data analysis with a view to developing an intervention designed to increase preventive healthcare for young children. Despite the fact that our sample populations were sourced from three very diverse socioeconomic backgrounds, we found that within each focus group, participants described a range of experiences from practices both well established with delivering HKCs and others just venturing out with service delivery. All focus groups expressed approval for fiscal-type interventions that maximised participation from population groups likely to be more vulnerable, and all groups discussed the likelihood that HKCs may duplicate services offered by MCHNs. Although small in number, the area where two PNs had established specific

HKC-clinics has rates of developmental vulnerability almost twice the state average [6], indicating they may have responded to an increased need in their populations.

Analysis using the TDF afforded a detailed understanding of the barriers and enablers that impact individually, within and external to the general practice environment, and distillation of the findings into the COM-B model has set the stage for developing the components of a complex intervention. Analysis indicates that a number of behaviours could be targeted, including practitioners' skills and knowledge as well as their beliefs about respective practitioner roles. The opportunities afforded by the mix of practitioners, the roles of support staff, the availability of equipment, and the social milieu created by government policy, suggest additional interventions. These are tabulated and discussed in detail below (Table 6).

At the practitioner level, PNs' capabilities could benefit from education and skills training that should incorporate interpersonal skills training to overcome their trepidation communicating developmental deficits to parents. The parent sensitivities they described reflect those found in a study of MCHNs, where strong parent-nurse relationships dissipated some of the difficulties experienced discussing weight with parents of young children [33]. From this study, clear demarcation of roles increased PN confidence, and training schemes could utilise respected leaders from both general practice and nursing to model shared roles for delivering different components of the HKC. For example, components of the HKC that incorporate clinical judgement and decision-making may be more appropriate to the role of GPs. Apportioned roles are already a part of Australian general practice where practice nurses assist a supervising GP with aged care health assessments and chronic disease management, using a team-based model of care. This also fits with international processes, outside of the US, where child health surveillance is a divided responsibility between different professionals [34].

Expressions of low confidence with the evidence behind the HKC, ambivalence towards outcomes, and confusion as to why it had been introduced in the first place, explained some of the reluctance of GPs to implement the HKC. Much criticism has been levelled at the low levels of evidence for some of the existing components of the HKC [35] and the inclusion of social and emotional 'mental' health assessments [36]. Information and provision of various developmental screening tools would serve to demonstrate the gains to be made when using structured developmental assessments, which have an evidence base for increasing the detection rate and reducing delays [37,38]. This would help to 'standardise' social and emotional assessments in particular, an aspect of development practitioners found particularly difficult to assess [39]. Practitioner education needs to be more explicit about the objectives of early intervention, the

advances that could be made as well as the limitations of current evidence [40]. Training workshops could be delivered through Medicare Locals, organisations that have previously assisted practices establish 'chronic disease management' programmes, and are positively viewed by practitioners as a source of assistance [41].

Findings in relation to the opportunities afforded by the broader social environment indicate key connections between immunisation services and delivery of HKCs. Delivery of a HKC at an earlier age would give more time to intervene early in a child's development, but primary vaccinations are complete by 18 months, an age too soon for accurate assessment of all aspects of a child's development. Alternatively, instead of a single health assessment, additional developmental assessments, not tied to vaccination time-points, could be funded to take place in general practice, in keeping with recommendations for a continuous process of child surveillance. Annual assessments, for example, would provide alternative surveillance opportunities where families have prematurely disengaged from MCHN services, although this could risk duplicating services. Alternatively, the co-location of MCHN services within general practice may encourage opportunities for child surveillance in some communities where access is limited [42]. Having a flexible delivery-model for child health prevention is likely to be welcomed by families juggling the demands of child-rearing when both parents work, for example, and may help to overcome the barrier of birth order (subsequent children are less likely than first-borns to receive MCHN services) that we identified in a parallel parent study [17]. Flexible service delivery models were also one factor that contributed to increasing vaccination rates from 53% to more than 90% in the 1990s [43]. In addition, this would send a strong message about the importance of early intervention to both parents and practitioners, with the potential for general practice to significantly contribute towards developmental surveillance. Recommendations designed to overcome other environmental barriers could include the promotion and funding of developmental screening tools suited to the time constraints of primary care services, provision, in paper-format, of health promotion literature, and support for IT tools and equipment that promote the implementation of HKCs.

A major motivator for practitioners was their belief about the consequences of preventive healthcare for young children. Practitioners' testimonies suggested that the availability, or otherwise, of referral services could enhance or constrain participation in preventive health, and pre-determined referral pathways clearly increased PNs' confidence to administer HKCs. Dissemination of information about local healthcare services, costs and availability, would reduce the considerable individual effort required by practitioners to establish and maintain up-to-date resource

repositories. The experience of a state-wide programme in the US validates linkage of community resources with practices, and was found to be essential for screening to be effective [44].

The fact that the HKC had acted as a 'catalyst' to professional development amongst some PNs and GPs suggests that some practitioners were poised to take on an extended role in paediatric healthcare. In addition, several GPs and PNs appeared amenable to practising more preventive healthcare and working alongside childhood educators and MCHNs. Primary care organisations could provide the support for networks of professionals, from different disciplines in child preventive healthcare, to develop expertise, share information, and build overall capacity. As well as increasing opportunities for collaborative care, this would also strengthen referral pathways. Precedent exists as similar collaborations have been successfully implemented across disciplines in Australian primary mental health care [45] with minimal central funding and ongoing voluntary commitment from a broad array of practitioners.

The barriers identified by this study are similar to those uncovered elsewhere, with notable exceptions. Practitioners were not deterred by inadequate reimbursements for providing HKCs, nor that they lacked the staff to conduct assessments. This may reflect important differences in models of service delivery, as these were barriers expressed by primary care clinicians in the US [16,46], where regular surveillance of children is strongly advocated, but delivered primarily by family physicians and paediatricians, rather than MCHNs. In addition, practitioners did not discuss the use of structured developmental assessments (which are commonly utilised in the US [47]). Whilst practitioners thought that tools specific to primary care practice would be useful, particularly when making assessments about social and emotional development, it was apparent that most practitioners were not aware of the various instruments currently available to them.

Strengths and limitations

There were several limitations to this study. The TDF was originally designed to be accessible and useful to an interdisciplinary audience to understand behaviours around evidence-based guidelines. The researchers had a combined wealth of experience in general practice, preventive care, and qualitative research methods but did not have access to the skills of a behavioural psychologist. Had we had such access, further insights may have been generated, but in this way we have adhered to the original intent of the TDF. Additionally, the fact that preventive healthcare for children, including HKCs, is based on low levels of evidence could have increased the variation in behaviours, so that some discrepancies may have been missed. The 40 practitioners who took

part in the focus groups were likely to be more motivated towards prevention or paediatric health, and less motivated practitioners may have additional deterrents to providing preventive healthcare to young children. This study was, however, purposefully aimed at practitioners working in socio-economically diverse metropolitan suburbs and captured a broad range of behaviours around the provision of HKCs. Focus groups run the risk of introducing bias resulting from an individual's desire to conform to social acceptability, and their perceptions were not actuality. Further studies, using a mix of quantitative and alternative qualitative methods, could be done to address this, and could obtain the views of practitioners from rural areas and other states where variations in health structures and service delivery may produce different results [48]. The fact that common and significant barriers were detected in this engaged group, however, implies that larger gains are likely to be made where the starting base is low. In addition, the participation rate for the focus groups was adequate, and responses were generated in an iterative process that proceeded across each of the study areas with no new data relevant to the topic of interest generated in the last of the six groups, suggesting that saturation had been obtained. Moreover, feedback, solicited from participants, did not amend the study's findings.

Despite these limitations, there were considerable strengths in this study. This was the first study to apply the TDF to understand preventive healthcare in young children and therefore adds to the body of work that constitutes knowledge translation research. Moreover, the use of the COM-B model as an additional step in the analysis increased the study's efficiency and proved that the framework was adequate for purpose. An alternative method would have been to analyse the data within the domains of the TDF as a single step. Previous research has used 'relevance criteria' to determine which domains could be targeted by potential interventions [49]. In this study, an unwieldy 11 of 12 domains would have had to be considered, making subjective decisions necessary and potentially causing important evidence to be disregarded.

Conclusions

Using an evidence-based methodology, we have shown that while the barriers to delivery of preventive healthcare and HKCs are considerable, opportunities do exist for improvement. The TDF has generated an increased awareness of the current situation and has clarified which barriers need to be targeted to improve implementation. As discussed, many interventions could be applied during a single programme, and a pragmatic approach needs to be taken to ensure the 'recipe for change' contains the correct 'measures' and 'timing,' as well as the right 'ingredients.' The design and mode of delivery of this complex

intervention will combine the findings from previous research with parents [17] and discussion with a group of stakeholders, prior to piloting and further testing in general practice.

Endnotes

^aChild health surveillance includes measuring growth and promoting healthy weight, developmental assessments including vision, hearing and social and emotional health, assessments of oral health, injury prevention, and other health promotion activities [50].

^bThe original TDF was reviewed, modified and published in 2012 [31], but because data was collected using the original framework (in 2011), analysis was made according to this framework.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

DM conceived and co-supervised the study with BB, KA and BB facilitated the focus groups and undertook data analysis, KA wrote the first draft of the manuscript, BB read and critically reviewed the manuscript and all authors read and approved the final manuscript.

Acknowledgements

The authors gratefully acknowledge the support received from the staff of Medicare Locals and practices that facilitated recruitment, and the general practitioners and practice nurses who took part in the focus groups.

Source of funding

This research was supported by a grant from the Shepherd Foundation, Malvern, Victoria, Australia. KA is funded by a Chris Silagy Scholarship from the RACGP and BB is supported by a fellowship from the National Health and Medical Research Council of Australia.

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Received: 19 January 2014 Accepted: 20 May 2014

Published: 23 May 2014

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doi:10.1186/1748-5908-9-60

Cite this article as: Alexander *et al.*: Barriers and enablers to delivery of the Healthy Kids Check: an analysis informed by the Theoretical Domains Framework and COM-B model. *Implementation Science* 2014 **9**:60.

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Comparison of findings with new research

From our qualitative research it appeared that increased rates of delivery of the HKC increased self-efficacy amongst clinicians. A mixed-methods study of PNs in New South Wales (NSW) investigated the role of the PN in prevention and child obesity. PNs who spent more than 10 per cent of their time delivering HKCs reported greater confidence providing lifestyle advice (diet and exercise) to parents than nurses who spent less than 10 per cent of their time on HKCs (Robinson, Denney-Wilson, Laws, & Harris, 2013). However, this study also reported that PNs with more than 5 years' experience were more confident than PNs with less than 5 years' experience, and that education, training, life experience and employment history were also key factors influencing confidence levels. I did not gather this level of detail from our practitioners.

The results from my analysis also indicated some differences when divided by groups. In areas of skills and knowledge, PNs were less confident and they declined to administer HKCs prior to specific training. GPs on the other hand, were more self-assured, although when they were pushed to consider specific components of the HKC, they expressed some doubt as to their ability to recall developmental milestones at specific ages.

The group difference related to PNs' 'Professional role and identity'. My study found PNs believed they were taking over work normally assigned to MCHNs and this undermined their self-confidence delivering HKCs. This 'perceived conflict' has not been uncovered by researchers studying the role of the PN in the provision of child health in NSW (Robinson et al., 2013; Walsh, Barnes, & Mitchell, 2015) and may relate to Victoria's MCHN services being more established than CFHNS in other states.

PNs were also mindful of needing to appear 'professional' when performing a HKC. They preferred clear boundaries regarding their own scope of practice and when to refer-on to the GP. It is worth noting that the role of the PN in Australia, is still expanding (Halcomb, Salamonson, Davidson, Kaur, & Young, 2014). In 2004, the Australian Government introduced Medical Benefit Schedule (MBS) items for a small number of PN-delivered services, with expanded roles in Chronic Disease

Management, and Health Assessments for specific age groups, including, in 2011, the HKC (Table 2). At the time of this study more than 60 per cent of general practices employed at least one PN [up from 40 per cent in 2003 (Halcomb et al., 2014)] coinciding with rising positive perceptions of nurses' role expansion in general practice amongst patients (Halcomb et al., 2014). This study also found that access to education and training as a facilitator of PN-role development, has increased over the last decade. Comments made by the nurses in our study, with regard to education/ training, barriers and facilitators and the delivery of HKCs, have been echoed in a national survey that explored nursing care of children in general practice settings (Walsh et al., 2015): PNs reported limited preparedness for the role from their background experience of nursing so that training and professional development were regarded as 'imperative' (Walsh et al., 2015).

Despite beliefs that primary care should play a central role in child preventive care (Waters et al., 2000) overall, GPs had more negative comments about HKCs than PNs. They believed the HKC had low levels of evidence for its components. They thought it came too late in a child's development to make early intervention effective and expressed negative beliefs about the consequences of discovering a problem through a HKC, due to constraints on services. Consequently most practitioners gave HKCs a low priority in their own day-to-day activities and preferred to delegate them to the PN. This preference was confirmed by researchers who conducted a qualitative study with 23 GPs in Sydney (Jeyendra et al., 2013). In this study, GPs opted to provide opportunistic episodes of preventive care to children (e.g. with vaccinations) due to the constraints of time and pressures from adult chronic disease management (Jeyendra et al., 2013). Future research could explore the feasibility of this model.

GPs' negative perceptions regarding the evidence behind the HKC, which is explored in the paper, deserves further comment. As already stated, in 2010, two years after the HKC had been introduced, and a year before this study, our review of the evidence behind the components of the HKC was published in a leading general medical journal in Australia (Alexander & Mazza, 2010b). We should

not have been surprised, therefore, that GPs recalled the lack of evidence behind the HKC, something not alluded to by the PN groups and reflective of exposure to the topic.

Conclusions – Practitioners study

This study concluded that many GPs struggled to understand the purpose of HKCs and remained ambivalent about it. The two GPs that appeared to embrace HKCs had both completed post-graduate qualifications in paediatrics. It seems probable that the majority of practitioners did not have ‘skin in the game’ because they did not prioritise the needs of children and may not have been cognisant of the significance of the ‘Early Childhood Development Story’ (Institute of Medicine, 2000). Much of the research into child development has taken place over the past two decades, so practitioners may not have been specifically exposed to this new area of knowledge during training. I asked our study participants this question but it is an area that needs further exploration if preventive child health is to gain further traction in general practice. Other fields of research that were poorly understood amongst GPs were ‘child social and emotional development’ and ‘structured developmental screening’. This is elaborated upon in the following section.

Findings from Parent and Practitioner studies combined: Social-emotional development of young children

In May 2011 the then Minister for Mental Health and Ageing, the Hon Mark Butler MP announced a bundle of measures that were to be put in place to address the increasing burden that mental illness placed on Australian society (Mental Health Australia, 2011). In broad-reaching proposals, a number of budgetary reforms were to be implemented that included enhanced detection and management of mental health in the community. Amongst this was a proposal that a government-appointed expert group would advise on the inclusion of a “mental health and well-being check” as part of the HKC. This announcement prompted me to specifically question parents about children’s mental health service access and experience. The topic was also included in the focus groups, so that contemporary opinions were gathered on this important issue from both parents and practitioners. Neither parents nor practitioners appeared alarmed or concerned about the content of these questions (social and emotional health of young children), although no-one reported knowledge about the budget proposals either. Parents realised that the topic was analogous to ‘mental health’ and half of parents responded favourably (9/18 parents asked) to the proposed investments in social and emotional health of children. Five parents expressed concerns regarding the timing of screening, however, and considered that testing at three years of age was too early (one parent believed it was too late). Four parents also held reservations about labelling and stigma. However, three families who had experienced a child with developmental problems said they had felt relieved once a diagnostic label was obtained. The views of parents and practitioners about child social-emotional health shared similar themes, so the results of this inquiry were combined and reported in the following paper.

'Can they really identify mental health problems at the age of three?' Parent and practitioner views about screening young children's social and emotional development

Australian & New Zealand Journal of Psychiatry
47(6) 538–545
DOI: 10.1177/0004867413476756

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Abstract

Objective: To report the views of parents, general practitioners and practice nurses on the proposed changes to incorporate social and emotional health checks of three-year-olds into the Healthy Kids Check, a one-off pre-school health assessment delivered through general practice.

Method: Participants were recruited from three socio-culturally diverse urban areas of Melbourne for a qualitative study involving 28 parent interviews and six focus groups with a total of 40 practitioners. Participants discussed child social and emotional development, health-seeking and preventive health care for young children. Transcripts were thematically analysed.

Results: Common themes showed: (i) Although both parents and practitioners were receptive to the idea of social and emotional screening, parents had limited knowledge about mental health issues for young children and the need for early intervention. (ii) All groups questioned the current capabilities of practice staff to identify problems, and practitioners expressed a need for further training and tools. (iii) Parents and practitioners cautioned that screening may increase parental anxiety and lead to unnecessary referrals. Practitioners countered this with examples of cases not recognised by parents. (iv) Participants questioned the value of earlier identification of problems without effective and accessible therapeutic pathways.

Conclusions: For programmes to be effective, parents need to be reminded of the benefits of early intervention and encouraged to attend preventive health appointments. Practitioners require further training and tools specific to the primary care setting. Further investment in specialist and allied health services is considered essential to assure better outcomes for young children's mental health following screening and referral. Practitioners welcome a more collaborative relationship with other professionals (e.g. early educators) in assessing children's social and emotional development. General practice has the capability but requires a more structured approach to assessing the social and emotional health of young children.

Keywords

Social and emotional health, child development, general practice, parents

Background and aims

At least 14% of Australian children aged 4–17 years have mental health problems (Sawyer et al., 2001) and 20% of 5-years-olds have clinically significant behavioural problems (Robinson et al., 2008). Effective preventive interventions for behavioural and emotional problems have been successfully applied to preschool children (2- to 3-year-olds) in the Australian context; however these interventions depend on early detection via universal screening in the primary care setting (Bayer et al., 2009).

General practitioners (GPs) are well placed to assess and manage child mental health problems (Vallance et al., 2011), but whilst 12% of GP contacts are with children (Britt et al., 2011), explicit social and emotional problems account for

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just 2.6% of these visits (Charles et al., 2011). Efforts have been made to increase GPs' identification of mental health disorders with children (Brown and Wissow, 2010; Sayal and Taylor, 2004; Zwaanswijk et al., 2005) but little is known about how Australian practitioners view screening for social and emotional problems. US data found primary care paediatricians embraced the use of standardised screening tools for developmental and behavioural problems, but raised concerns about which instruments to choose, the need for additional time to screen, and the lack of referral services for identified problems (Tanner et al., 2009).

International research also identified that parent satisfaction with preventive healthcare services centred on the age of the child and the parent-provider relationship (Radecki et al., 2009; Roche et al., 2005). US parents regarded the social and emotional health of their children as an important indicator of school readiness (McAllister et al., 2005), but did not always recognise child behavioural or emotional problems as mental illness (Pescosolido et al., 2008) and therefore did not necessarily express concerns when attending their physicians (Sayal and Taylor, 2004; Sayal et al., 2006).

Australia's universal child health surveillance system is conducted through local council child and family health nurses (CFHN), with state-based variations in policy and service provision (Schmied et al., 2011). In Victoria use of CFHN services decline as the child gets older, with less than 60% of children completing the final visit scheduled at 3½ years of age (Moore and Grove, 2008).

To counteract this decline 'The Healthy Kids Check' (HKC), a one-off health check aimed at preschool children, has been available since 2008. Administered by practice nurses (PNs) and GPs, the HKC comprises mandatory and non-mandatory components to assess growth and development, and offers opportunities for health promotion (Figure 1). The HKC is meant to function as an initial screening test, from which children identified with problems can be referred on for diagnostic testing. Proposals to include the assessment of a child's social and emotional development and bring the check forward, from 4 years of age to 3 years (Roxon et al., 2011) have been strongly contested (Frances, 2012). However, overall the uptake of the HKC has been low, for reasons currently unknown (Medicare Australia, 2011). It is therefore opportune that the perceptions of practitioners and parents about preventive health care for children in general and mental health screening tests in particular, be explored.

The aim of this study was to understand parent and practitioner views regarding screening for social and emotional health problems in the context of preventive health care for young children.

Methods

Three socioeconomically and culturally diverse areas of Melbourne, serviced by the Bayside (high socio-economic); Westgate (low socio-economic) and Dandenong-Casey

Figure 1. Components of the current Healthy Kids Check.

Mandatory:

- Height
- Weight
- Eyesight
- Hearing
- Oral health
- Question toilet habits
- Note allergies

Non-mandatory:

- Discuss eating habits
- Discuss physical activity
- Speech and language development
- Fine and gross motor skills
- Behaviour and mood
- Other examinations considered necessary by practitioner

(culturally and linguistically diverse) Divisions of General Practice, were chosen as the setting for our study. The third suburb was targeted to ensure the sample included the opinion of parents living in Australia for less than 10 years, as it was expected that their experience of accessing preventive health care could be different from parents who had either resided in Australia all their lives or acculturated to the Australian way of life.

Parents were recruited from the community using flyers placed in settings likely to be frequented by young children and their parents (Table 1). Additional participants were recruited through snowballing. Participants were selected if they parented at least one child between the age of 3 and 5 years, spoke English, and had resided in Australia for more than 12 months. Telephone interviews, using a semi-structured questionnaire, were conducted between May and July 2011, with each interview lasting approximately 45 minutes. Topics covered child developmental health (e.g. growth, vision, hearing) and social and emotional health, perceptions of preventive health and health-seeking (Figure 2).

Recruitment was stopped when data saturation was achieved.

GPs and PNs were recruited through advertisements placed by the three Divisions of General Practice (now known as Medicare Locals). Three GP and three PN focus groups (5–10 participants) were conducted, two groups in each Division area, between June and October 2011. Discussion was facilitated by one researcher (KA), with notes taken by a second researcher (BB). Questions related to current provision of preventive health care to young children, including HKCs, and the anticipated changes in social and emotional health assessments (Figure 3).

Following signed consent, interviews and discussions were audio-recorded and participants were offered gift vouchers (parents \$75, PNs \$80, GPs \$200). Approval was obtained from the Monash University Human Research Ethics Committee.

Table 1. Characteristics of parents interviewed ($n = 28$).

Characteristic		Number or range
Age (years)	Mean	40
	Range	30–47
Gender	Female	27
	Male	1
Migrant less than 10 years	UK	4
	India/Ceylon	2
	China	1
	Vietnam	1
	Hong Kong	1
	Lebanon	3
	Iraq	2
Marital status	Married	25
	Single parent	3
Number of children	3–4	11
	2	15
	1	2
Health insurance	Yes	10
	No	14
	Unknown	4
Education level	Not completed secondary school	3
	Other qualification after secondary school	7
	Undergraduate	12
	Postgraduate	6
Recruited	Playgroup Victoria newsletter	12
	Kindergarten notice	4
	Community centre	2
	Supermarket notice	1
	Maternal child health centre	1
	Snowball	8

Data analysis

Verbatim transcripts were read repeatedly to gain familiarity with the data. Two researchers (KA and BB) independently coded the data and proceeded with a thematic framework analysis: key topics were identified, previously coded data were revised, in an iterative process to maintain quality within the data (Braun and Clarke, 2006; Green et al., 2007). Over several meetings, results were discussed and consensus was achieved, with a third researcher (DM)

Figure 2. Sample of parent interview questions.

Have you ever been concerned about your child's growth, development or behaviour?

Has your child been sick in the last 12 months?

Have you had your child vaccinated?

What services are available to you to help you monitor your child's health, growth and development?

Have you heard about the Healthy Kids Check?

Have you heard about the new social and emotional well-being checks that will be introduced at the age of 3 as part of the mental health reform package in the latest budget?

Have you taken your child for routine check-ups with the CFHN?

How about check-ups with other health professionals, e.g. dentist, optometrist?

Do you ever use the internet to help you monitor your child?

Do you ever discuss issues about routine health care with your family or friends?

Do you have a regular doctor for your child?

How satisfied are you with your GP/CFHN services?

\$ CFHN Child and Family Health Nurse equivalent to Maternal Child Health Nurse (Vic)

Figure 3. Examples of prompts for focus groups with practitioners.

What do you currently do about HKC in your practice?

Who do you think should be screening children?

How easy or difficult is it to perform the components of the HKC? Why?

There's been some discussion about bringing the HKC forward to the age of 3 years and including a social and emotional well-being check. What do you think?

Can you assess the social and emotional well-being of a three-year-old?

What are the outcomes from doing HKCs – for the patient and the practice?

Do you have the equipment and resources to help with a HKC?

Do you have any systems in place to run HKCs?

Has anyone else or any organisation influenced your decisions to conduct a HKC?

Are there any emotions associated with screening children's health and development?

\$ HKC Healthy Kids Check

resolving differences and overseeing the linking of codes into categories. NVivo 8 software (NVivo, 2008) was used

for coding and to aid analysis. All data were de-identified and pseudonyms applied to parents' reports to maintain anonymity. For the purposes of this study, data which related to the assessment of a child's social and emotional health, learning difficulties, behavioural problems, and developmental disorders, were coded 'social and emotional developmental and mental health'.

Results

Twenty-eight parents were interviewed, with a mean age of 40 years; only one participant was male (Table 1). Ten participants were from culturally and linguistically diverse (CALD) communities. Twenty-two GPs (12 female; 10 male) and 18 PNs (all female) participated in discussions each lasting two hours. Four common themes were identified when the social, emotional, behavioural and mental health screening of young children was considered:

1. Current thinking about social and emotional health.
2. Capabilities of practitioners.
3. Challenges associated with the outcomes of screening.
4. The strategic benefit of labelling and access to services.

Current thinking about social and emotional health

Parents were conscious of their child's social and emotional development and described their children's personalities in terms of their ability to form friendships. Although they recognised this as being intrinsic to their child, they also believed that exposure to child care would help them overcome socialisation difficulties, and reduce separation anxiety, and this was seen as important preparation for school.

"She finds it quite easy to interact socially and maybe that's because she went to child care when she was quite young, and she's always kind of been around other children, and she's not really the shy type." (*Belinda, 40 years, Bayside, two children*)

Although generally receptive to the proposal to screen the social and emotional well-being of young children, the predominant belief among parents was that an assessment at the age of three was too early in the child's development.

"But can they really identify mental health problems at the age of three?" (*Anne, 41 years, Westgate, three children*)

"Their social and emotional well-being is the big issue I think when they reach that school age." (*Justine, 42 years, Bayside, three children*)

In contrast, amongst practitioners, although there was debate about the ideal age of screening, the need for early intervention, well before the age of four years, was recognised as crucial:

"I think that they should be screened at a younger age. I think that four is absolutely ludicrous. I think the ideal time is 12 to 18 months for anything to have any chance of reducing morbidity later on and the social implications and the consequences of those developmental disabilities." (*GP 1, Bayside group*)

Parents and practitioners raised concerns that a one-off assessment would not accurately gauge children's social and emotional health, with daily mood variations, temperament and the clinic environment all likely to influence behaviour.

"Well, it all comes down to the child and how comfortable they are because children can change on any given day and I think some are confident in any new surroundings and with new people and some aren't." (*Natalie, 39 years, Bayside, two children*)

"You've got a child who is not necessarily, because you've just given them immunisations, not really interacting with you." (*PN 1, Bayside group*)

Practitioners discussed the 'child within the family constellation', the interplay between child temperament, family dynamics and social environment, which was felt to complicate the assessment of a child's social and emotional health. They wondered if the frequency of 'stand-alone' social-emotional health issues justified screening for them.

"How many are just a reflection of poor socio-economic, or household issues? So I'm sure there are three-year-olds with mental health issues and fantastic families and parents, but I would have thought that was an incredibly small amount." (*GP 1, Westgate group*)

Two practitioners (Dandenong GP 1 and Bayside PN 2) thought parents would be reluctant to disclose information about their child's social and emotional development in case it reflected on their parenting skills and could cause a child to be removed from their care. This belief was not expressed by this group of parents, though they recognised that family conflict such as parental separation (3/28) could have negative social and emotional outcomes and could cause behavioural problems in their children. Those affected sought services to help with these.

"When they were little ... my wife and me, including the grandparents we always have conflict, we always sort of fight, you know. That might have impacted on [my daughter]." (*Li, 44 years, Dandenong, two children*)

"Last year when my relationship broke down and I took [my son] there because I had concerns for him on his emotional ... health and wellbeing. I asked her ... to advise me how I can look after my child." (*Tien, 30 years, Dandenong, one child*)

Capabilities of practitioners

Both practitioners and parents questioned the practitioners' capabilities. Parents were uncertain that general practice personnel were skilled enough, or had enough time, to

identify social and emotional disorders in young children, while PNs expressed a universal need for extra training.

"I just can't imagine my regular GP really having that much specialist information or knowledge about that kind of thing ... I don't know, it seems like a bit of a stretch" (*Claire, 42 years, Westgate, two children*)

PN 1: "It would be such a no go zone for me personally... I think it is absolutely terrifying. It would be well out of my depth, anything to do with the psychology of a three-year-old." (*PN 1, Bayside group*)

Although GPs were generally more positive than PNs about their capabilities, undertaking developmental assessments was met with mixed responses and varied according to specific skills acquired during training. Reservations were expressed about making specific diagnoses.

"I like seeing children but I've never been so great at the whole developmental scheme of things ... The Denver Scale, I really am terrible at it." (*GP 2, Westgate group*)

"I suppose there are quite a number of ... kids with autism to do ... an emotional check. [But] are we qualified to do it? Are we really qualified to do it? ... I wouldn't even make the diagnosis ... of dementia, in patients that I'm almost certain have dementia, without going through a team of people, let alone diagnosing emotional problems in children. I think we should defer to professionals well trained in this." (*GP 2, Dandenong group*)

The development of appropriate tools to assist screening was also widely discussed. Tools were seen as likely to increase efficiency and efficacy, as it was deemed important that cases should not be missed. Further, practitioners believed they would help set a minimum standard between practices.

"Rather than just saying, 'Assess their emotional well-being.' Give us the tool ... a tool that everybody can use, the same tool, because if we're all doing it separately then where's the base to start from? I think we need to all be doing a similar emotional well-being check for it to be of any value." (*PN 1, Dandenong group*)

Several members from one group of GPs had recently attended a presentation about autism and were optimistic that screening for this was practicable. In general, however, practitioners were not routinely applying behavioural screening questionnaires and only one PN had used the Parents' Evaluation of Developmental Status questionnaire (Glascoe, 2010). The cost of questionnaires was an additional barrier cited.

Whilst some parents recognised social and emotional health screening as being the domain of the CFHNs, GPs and PNs held conflicting views about which health practitioners should conduct screening. PNs suggested that because CFHNs' entire focus was early childhood, they would be better placed to do this, but GPs regarded a shared role as more helpful. GPs also discussed a possible role for external agencies, such as early childhood educators. They judged that a child with a social developmental problem

would be more easily identified in a group situation by a professional who saw them on a regular basis.

"If you want to know if a child is ready to go to school the best people to judge that is ... actually the kinder teacher ... not the parents, it's the kinder teacher, seeing the kids and their peers. Just from having the experience of going to kinder and seeing how the kids interact in a group and how easy it is to see who is a bit strange, I was thinking ... wouldn't it be more efficient to use the resource of kinder and day-care centre to kind of get a foot in there." (*GP 2, Bayside group*)

Challenges associated with the outcomes of screening

The context of screening for social and emotional health problems was also viewed as problematic when it came to considering the outcomes of those assessments. The Dandenong GP focus group were fearful that screening would open 'a can of worms', and one GP, who worked with severely disadvantaged groups, was concerned that this would increase reporting to social services and lead to conflict between parents and practitioners. This view was concurred:

"So if we over investigate it, over discover trouble ... we create a medical and social monster." (*GP 3, Dandenong group*)

PNs were particularly concerned about being the 'bearer of bad news' if they suggested to a parent that something may be wrong when screening children.

"I don't feel comfortable sometimes with probably talking to parents if there's issues. It's quite daunting ... parents don't like to hear that something's wrong with their child." (*PN 2, Dandenong group*)

Both parents and practitioners worried about the consequences of diagnosing a normal child as having a problem and unnecessarily raising parental anxiety. The stigma associated with a diagnostic label and the possibility that a child would be treated differently once a label was applied, leading to secondary changes in the child's behaviour, were additional concerns.

Some GPs felt pressured to refer for a second opinion to "appease parents".

"Well educated parents – they've already got a bit of information... saying that my child has got this, got that, can you have a look at my child, [does my child have] ADHD or something like that ... Then you ask the child ... [No] signs of ADHD. But the parents are trying to insist something, so [I have] to send them to the paediatrician." (*GP 3, Westgate group*)

On the other hand, practitioners also recounted experiences of parents who failed to realize, or apparently denied their children had problems:

"I picked up a little boy who obviously had anxiety disorder just by the fact he had these ... hand movements and stuff like that. And mum would just say, 'I just thought he was a bit shy'." (*GP 1, Bayside group*)

The strategic benefit of labelling and access to services

Whilst parents with children who did not have diagnosed disabilities were concerned about inappropriately labelling children, for families who were dealing with these problems, the diagnosis was met with relief. Julia, whose son had not been diagnosed with Asperger's until the age of ten, said:

"This child ... he's been a very tricky child pretty much all his life. A very challenging child to have to parent, and I've struggled with it for a long time ... He saw a psychologist at school ... she thinks he has Asperger's and he makes up rules for himself about things. And since then I've read a little bit about Asperger's and I'm going, 'Oh, the penny is dropping! Oh this is so familiar.'" (*Julia, 41 years, Westgate, three children*)

Three families, including Julia's family, had experienced developmental problems that presented as learning or social disorders in school, despite difficulties being apparent for years beforehand. Their stories reflected a 'journey' to comprehend their child's behaviours, and the label was viewed as necessary to access funding and help.

However, the relief of the diagnosis was eventually replaced with feelings of frustration and dismay as they encountered difficulties and significant costs in accessing services. Personnel changes, insufficient and delayed appointments for services such as speech therapy, psychiatry, psychology and paediatrics were reported. Both parents and practitioners questioned the worth of screening when referrals and outcomes could not be guaranteed.

"We waited out that six or seven months and then instead of getting the appointment we got a letter saying, due to cutbacks, they've had to reassess their waiting lists and they're not going to offer [our son] that two day assessment ... he just got bumped off the waiting list ... So ... we saw an educational psychologist and had a four hour assessment that cost \$1100 which we can't claim back ... It's been a very expensive process ... All we got from that appointment [was] '[this child] has severe dyslexia'. It didn't really give us a pathway or a way ahead. So you kind of have the relief of going, 'Thank God we know what's wrong' but then you go, 'Well what do we do?'" (*Elisabeth, 44 years, Westgate, two children*)

"I've just had a few of these 'query autistic' kids come back and you look at them and you think, 'Oh yes, maybe a bit dodgy, I don't know'. And then they go off for their early intervention which is one hour of play therapy a week. That's not going to cut it." (*GP 1, Westgate group*)

Discussion and implications for practice

Parents were highly concerned about the social and emotional health of their children and regarded this as an

essential component of preparation for school. This reflects the findings of McAllister et al. (2005), where lower-income US families emphasized social and emotional health as important to facing the challenges of the school environment. Australian parents might therefore be quite receptive towards this aspect of developmental assessment.

Parents and practitioners had common concerns about social and emotional health assessments proposed in changes to the HKC. Whilst practitioners were well informed about problems facing young children, parents were less knowledgeable, and did not always appreciate the need for, early intervention for which there is now a significant evidence base (Kowalenko, 2012). For screening programmes to be effective, parents would need to be reminded of the benefits of early intervention and encouraged to attend preventive health appointments.

The capability of practitioners was questioned by both parents and practitioners. Parents usually assigned screening for social and emotional problems to CFHNs, recognising that time pressures in general practice may inhibit engagement. Practitioners did not apply behavioural questionnaires even when they conducted developmental assessments in their practice. Reasons for this are unknown but cost barriers were identified as one factor. An Expert Committee, appointed to oversee the development of the new 'three-year-old HKC', has been tasked with developing a training programme for GPs (Department of Health and Ageing, 2010). This is likely to be welcomed by practitioners, as this study identified training as a major need of both GPs and PNs.

Similarly, the development of tools which can be effectively applied within the tight time constraints of primary care are seen as fundamental for successful implementation. Concerns regarding training deficits and problems with screening tools were also widely articulated by paediatric physicians in a large US study of contemporary needs in "well-child care" (Tanner et al., 2009). Our study also identified that training programmes would also need to consider practitioner interpersonal skills with regard to the delivery of screening programmes and communication of findings to parents, as this was seen as a barrier for PNs in particular.

The reluctance expressed by some practitioners to undertake social and emotional developmental screening is reflected in the general debate surrounding prevention in primary care which centres around competing demands for practitioner time (Russell, 2005). Practitioners justifiably feel overwhelmed by an ever-expanding array of preventive activities (Yarnall et al., 2003) so it was perhaps natural that they considered other professionals could be involved in developmental assessments. Early-childhood educators already make assessments of children to determine their school-readiness. Those children found not to be school-ready may benefit from referral to general practice for developmental assessment. Part of a government 'roadmap'

towards structural reform of the Australian mental health system includes partnerships between health and education as key to prevention and early intervention. Medicare Locals, primary healthcare organisations recently established to respond to local healthcare needs, are ideally placed to facilitate such partnerships (Davies, 2010). The US study (Tanner et al., 2009) also highlighted deficiencies linking private practice to community resources and speculated how integration could change existing surveillance and management of developmental and behavioural problems.

Significant waiting periods and large financial barriers made earlier detection ineffectual and frustrated practitioner and parent alike. Expansion of programmes which utilise public-private partnerships would alleviate demand and would increase the flexibility of services, particularly if children could access treatment according to need and before diagnostic labels have been applied. This has been argued for by Wissow et al. (2011), who advocate a “common factors approach to treatment” of children with behavioural and emotional problems, in primary care, so that a core set of interventions is commenced when socio-emotional or behavioural problems arise, and more specific treatments are accessed as diagnoses are refined. Currently, access to services before diagnosis is limited but early initiatives like ‘Playconnect playgroups’, available to children with autism and autism-like disorders, reflect a start (Playgroup Australia).

Limitations of the study

The opinions of GPs, PNs and parents who self-select for a study will not be representative of all practitioners, nor be generalisable to an entire population. It is likely that these practitioners are already more engaged in child health. Future research could target younger parents and rural communities, populations which are likely to face additional barriers when seeking preventive care and mental health services, as well as gauge the opinion of early childhood educators in taking on social and emotional assessments.

The strengths of the study are in the corroboration of opinions by parents, GPs and PNs across a wide socio-cultural spectrum. This study replicates findings from a US study (Tanner et al., 2009). Our conclusions provide an important foundation if future interventions aim to increase the delivery of social and emotional preventive health care to young children.

Conclusion

The recent debate regarding introduction of the 3-year-old check has highlighted general issues associated with screening programmes – especially the identification of false positives – with attendant risks of medicating and stigmatising normal children, and raising parental anxiety (Frances, 2012; Jureidini and Raven, 2012; Levy, 2012; Newman,

2012; Prior, 2012; Toumbourou, 2012). This was a concern underscored by both parents and practitioners, but for those parents who had experienced years of anguish before obtaining diagnoses of developmental disorders, the ‘application of the label’ was viewed more positively. GPs have always had a role in the developmental assessment of children, and have learned to incorporate assessments of parents’ mental health, parenting style and attachment issues, and remain mindful of the potential for child abuse (Royal Australian College of General Practitioners, 2011). Broadening this to include more specific aspects of social and emotional development is not beyond their brief, but could benefit from a more structured approach, supported by community collaborations, so that parents are able to provide the best opportunities for their young children’s learning, social and emotional well-being and development.

Funding

This research was supported by a research grant from the Shepherd Foundation.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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Commentary – Social and emotional health of young children

The above paper was prompted by a controversy that was brewing at the time. In June 2012, emeritus professor of psychiatry at Duke University in North Carolina, Allen Frances, who was visiting Australia, spoke about rapidly escalating rates of mental illness globally. He assigned this to over-diagnosis and the push from “Pharma,” rather than a true rise in rates of mental illness. Frances, who had also been chair of the task force on the most widely used diagnostic manual in psychiatry, the Diagnostic and Statistical Manual of Mental Disorders – Fourth edition (DSM-IV), gave several lectures on “Diagnostic over-inflation” and cited the changes to the HKC as an example of how over-medicalisation might result in children receiving unnecessary treatment with psychotropics:

“Simply stated, this is a bad idea on psychiatric grounds and unjustifiable as public policy” (Frances, 2012).

Professor Frances’ comments caused a media storm (Figure 4). Professor Frank Oberklaid, director of an expert panel that was making recommendations to government regarding the HKC, reminded audiences that 50 per cent of adult mental health problems began in childhood. He was at pains to clarify that the HKC was not a mental health check (despite the term ‘mental health and wellbeing check’ having been applied in the original Ministerial announcement) but, rather, an opportunity to address parent concerns and enter into a conversation with a health professional about their child’s development. A series of articles published in the *Australia and New Zealand Journal of Psychiatry* in August 2012 debated the pros and cons of the HKC and, specifically, *screening* the mental health of young children.

Some psychiatrists firmly upheld the traditional views regarding screening tests and argued that the original Wilson-Jungner criteria (1968), for appraising the validity of a screening programme, should be applied to each of the components (of the HKC) that had a proven health benefit (Henderson, 2013; Jureidini & Raven, 2012). Others argued that the *range* of what constituted normal child development at aged three precluded screening and risked labelling children. They also contended that proposed

attention and learning difficulties in the period immediately before school (Levy, 2012). Testing the predictability, or not, of early screening for later mental health problems implies that some children do track from preschool into primary school years (Beyer, Postert, Müller, & Furniss, 2012) but sensitivity and positive predictive values are low (Sawyer et al., 2014).

Proponents of early intervention, however, cited the potential benefits of interventions (for parenting maltreatment, post-traumatic stress disorders, anxiety and conduct disorders) if HKCs could identify mental disorders (Kowalenko, 2012; Toumbourou, 2012). Newman asserted that early identification was *vital* to reduce risk and advocated for programmes of “development and attachment checks,” to begin in the antenatal and postnatal periods and continue throughout infancy (Newman, 2012). The debate amongst psychiatrists mirrored similar discussions they were having at the time, around the identification of *psychosis-risk* (problems of incorrectly identifying people not truly at risk, stigma, labelling and potentially harmful treatments) (Young 2011).

After summarising the pros and cons of population screening for social-emotional health of 3-4 year olds, and in the absence of a reliable and valid tool that could be applied in primary care, Daubney (2013) made two specific recommendations: to invest in longitudinal population studies from birth that collect multiple risk factors and outcome parameters (to establish group norms and support service planning) and to develop a population based screening instrument (Daubney, Cameron, & Scuffham, 2013). Unfortunately, these solutions postpone any immediate progress on the assessment and subsequent identification and remedying of social and emotional health-problems of young children.

In the intervention my supervisors and I were proposing, the PEDS parent questionnaire was included as a tool to both prompt practitioners to consider the developmental milestones of young children and follow through any concerns with secondary screening. One of those secondary screens proposed was the Pediatric Symptom Checklist – a publically available, brief questionnaire that improves the recognition of psychosocial problems in children (from 4-18 years) (Jellinek & Murphy, 1988). (The revised and expanded HKC had also incorporated the same questionnaire). This established a two-

stage process for identifying psycho-social or behavioural problems. It tried to prevent ‘over-diagnosis’ but provided additional support for early identification, so that children did not ‘slip through the net’. Although PEDS is not commonly used in general practice, it is routinely used by Victoria’s MCHNs. Structured developmental screening is increasingly being employed in the US and some states have regulated routine psychosocial screening for children from lower socio-economic backgrounds (who receive Medicaid insurance funding). Kuhlthau et al. (2011) reported that a funded, court-ordered mandate for mental health screening during well-child visits in Massachusetts, significantly increased the number of children screened, and identified substantial increases in numbers of children at risk (Kuhlthau et al., 2011). Higher level interventions, which represent the decisions made by authorities, can make rapid and substantial improvements to healthcare processes. The challenge then is to have sufficient health services available to treat the increased numbers of children identified.

Our contribution to the discussion about child social-emotional health *screening* has since been cited in two further publications (Croft, Stride, Maughan, & Rowe, 2015; Sawyer et al., 2014) and referenced a further 11 times because it provides one of the very few pieces of work that examines young children’s mental health in the setting of general practice. Amongst these, citations refer to: our findings regarding parents’ lack of awareness or incorrect beliefs about children’s socio-emotional and behavioural development (Crone, Zeijl, & Reijneveld, 2016; Oh & Bayer, 2015; Oh, Mathers, Hiscock, Wake, & Bayer, 2015); Australia’s proposed social emotional health check (Burakevych, McKinlay, Alsweiler, Wouldes, & Harding, 2016); and our commentary regarding potential collaborative assessments (between early educators and healthcare professionals) of young children (Garvis, Phillipson, Rosunee, Kewalramani, & McMahon, 2016). This last study described a partnership between parents, early educators and MCHNs that conducted joint health checks at a single (early childhood centre) site. It highlighted the importance of context when performing health checks and found the familiar environment worked to relax the child and empowered parents. The educator and MCHN also found the inter-disciplinary perspective strengthened the assessment of the child’s development (Garvis et al., 2016). The study built on the narrative obtained from our research

and our conclusions that a partnership between early educators and health practitioners would augment child developmental assessments and potentially benefit communication and integration of private practice with community. The viewpoints of professionals already invested in child preventive health and development, which called upon the analysis of the barriers to care, were the focus of the next phase of our research.

Chapter 4. Designing the Intervention

Obtaining input from Stakeholders

The next stage of development of the intervention required presentation of our findings and input from a broad group of stakeholders to obtain their feedback regarding the key barriers to child preventive healthcare, what needed to be addressed as a matter of priority and what enablers could be leveraged to achieve these gains. All aspects of preventive healthcare presented barriers to practitioners: growth (weight and height), health (e.g. oral health), sensory (vision and hearing) and developmental (motor, cognitive, social and emotional) assessments.

In Victoria, MCHN services provide regular growth and developmental monitoring of children from birth. The implications of this service-overlap meant it was important to gather the opinions and perspectives of various stakeholders including MCHNs. A meeting was convened in April 2013. The purpose of the meeting was to develop an intervention to increase the effectiveness of preventive healthcare for young children from general practice and to: briefly review the methodology of the first phase of the project and understand the context of HKCs in general practice; review the outcomes so far (the barriers and enablers) and use the COM-B to further develop the components of the intervention.

Recruitment proceeded by recontacting participants (PNs and GPs) in the focus groups [the report from the findings was sent to generate feedback and to determine expressions of interest for the stakeholder group (Appendix 7)], e-mailing MCHN policy-makers, contacting local MCHN co-ordinators, and tapping into local professional networks. I contacted 'Parents Victoria' (Parents Victoria, 2017) to encourage a consumer perspective but two parents, who initially expressed an interest, declined the invitation due to scheduling difficulties. The number and mix of participants was restricted to encourage perspectives from all participants (requests to attend from an additional MCHN and PN were rejected by the research team). The half-day meeting took place in a location accessible to the majority of stakeholders whom comprised: two GPs and three PNs from the focus groups; two paediatricians – one with a special interest in developmental health, the other a special interest in immunisations; the

CEO of one primary healthcare organisation; the leader of the Royal Australian College of General Practitioners (RACGP) Child Health Special Interest Group; a MCHN-coordinator/project officer; two MCHNs; myself and my two supervisors.

Findings from the barriers analysis were presented and the group went on to discuss: the role of primary health networks (Medicare Locals), opportunities for inter-professional collaboration, professional roles and how to secure outcomes and referral pathways for HKCs (Table 3). The COM-B model was used as a framework to pull together the results and make recommendations. MCHNs believed general practice should take a secondary role in the developmental surveillance of children, but potential *opportunities* for colocation and collaboration were explored with agreement that shared models of care would improve communication between the professions and best support children and families. Participants believed primary health organisations could oversee the delivery of better referral pathways and thus *motivate* practitioners through improved outcomes for children.

Table 3. Quotes from Stakeholder meeting matched to COM-B

Evidence- statements from Stakeholder group	Component of COM-B
<i>Talking with a GP he said “When I pick up a problem quite often I don’t know where to refer next’ (ML)</i>	Capability
<i>A question I’d like to ask is ‘How many GPs know how to use PEDS and know what PEDS is’? Because it’s a tool that’s used internationally, nationally and throughout MCH ... that’s an example of what needs to be set (MCHN 1)</i>	
<i>PEDS is really dependent on the person’s knowledge of growth and development as a background otherwise it can’t be used properly, so you’ve got to have that baseline knowledge to use PEDS as well as the half day training. You’ve got to have quite extensive training (MCHN 2)</i>	
<i>My practice has 15 doctors the majority of which are part-time and probably 2 out of the 15 get all the paediatrics and nobody else gets the paediatrics...because they become renowned (GP- Researcher)</i>	
<i>Although children are increasing in absolute numbers... they are decreasing as a percentage of patient consultations in general practice so...that’s a very big worry (RACGP)</i>	Opportunity
<i>The issue is similar to other kinds of referral issues ... you are not going to spend 10 minutes looking on a website ... if you aren’t familiar with that particular service, if you haven’t referred them before... you don’t know what response you’re gonna get. GPs like to refer to people that they know and they will, in preference, refer to that known path ... It’s not just about having a directory, it’s about currency (GP- Researcher)</i>	
<i>The hours if both parents are working are very difficult so, we are going to locate a couple of MCHNs in a large general practice in those early evening hours....at the same time bring GP and MCHNs closer together. I think that fragmentation is part of the problem (ML)</i>	
<i>GPs-They are not really hearing us, they don’t understand what our job entails (MCHN3) It’s also about building those relationships, you then get that feed-back from both professionals ... it’s also about understanding the role of MCH ... people still have a bit of a guess about what we do and I think that old tale ‘Oh we weigh babies’, it still lingers on in our community.... It’s more about building relationships and understanding roles (MCHN 2)</i>	
<i>In a fragmented system we don’t understand what one another does (RACGP)</i>	
<i>Medicare Locals are in charge of coordinating services, maybe, what services are available? If that was coordinated (GP1)</i>	

Evidence- statements from Stakeholder group	Component of COM-B
<i>Have one point of contact for a GP and they don't have to think about the services and the eligibility and what the waiting list is, they just have to refer in and it's all sorted for them so the client journey is a whole lot easier ... that is part of what we are meant to be doing (ML)</i>	Opportunity continued
<i>The system is in chaos, the Australian primary healthcare system. Now, the main thing about the present is that for the first time, from a policy level, people are actually committed ... not only to stitching up a fragmented system, but they've also got 'The Early Childhood Story', so we've got the stars beginning to align up. ... But never before have we had policy makers at the top seeing: 1. You need a quality primary healthcare system, 2. What we've got is not quality and it needs stitching up and 3. These same people are getting 'The Early Childhood Story' (RACGP)</i>	
<i>Is there some way that a summary that is friendly to a GP ... is there any form of export process that is able to be built into the system, ...the parent held record is often not with the parent, is there any way that an export can be incorporated into a linked GP record, or vice-versa with a MCHN... export function can be built in... it may be an appropriate investment for the government to require it or pay for it to be built into data systems compared to a lot of cost and effort that goes into trying to improve systems relationships, if there is data that is useful (Paed 1)</i>	
<i>We have to move away from the thought that 1-1 service provision is the solution ... what children need are child-friendly communities ... There is a big need for a revolution in both organising what we've got and rethinking how to promote community capacity, which is more than building professional capacity (RACGP)</i>	
<i>Platforms –which is a whole idea about reorganising communities to be supporting families so they've been working...at the local government level...help communities to identify their stakeholders and how to bring services together (Paed 2)</i>	
<i>What we don't know at the end of the day is what's the difference. In terms of health outcomes is my 10 minute screen equivalent to your ¾ of an hour plus half an hour plus ...The thing that we got for immunisation was ACER, a huge contribution to the success of the programme... If we could get data to answer the questions that would be marvellous (RACGP)</i>	Motivation
<i>There's a question of selling 'The Early Childhood Story' to GPs and PNs. People don't have to become expert in child development; they have to know why it's important. They have to understand how adverse childhood experience buggers up the rest of your life (RACGP)</i>	
<i>We still don't know (the outcomes), we don't want to open a can of worms (Paed 2)</i>	

MCHN= Maternal Child Health Nurse; RACGP = RACGP special interest group lead; ML= Representative from Medicare Local; GP = General practitioner; Paed = Paediatrician

Intervention Mapping to determine the ingredients of the Intervention

The term “Intervention Mapping” originally applied to a protocol developed by Bartholomew et al. in 1998, in the field of health promotion. It aimed to change health behaviours through the application of theory and evidence based research (Bartholomew, Parcel, & Kok, 1998). As already discussed, the 12 (later revised to 14) theoretical domains from the TDF, condense into three core tenets of behaviour: capability, opportunity and motivation (the COM-B model). To proceed with the development of an intervention, the TDF and COM-B models, which elucidate the reasons behind behaviours, are ‘mapped’ into the second system - ‘The Behaviour Change Wheel’ (BCW) (Michie et al., 2011). The BCW matches underlying behaviours to nine specific interventions termed, ‘Intervention Functions’: Education, Persuasion, Incentivisation, Coercion, Training, Restriction, Environmental restructuring, Modelling and Enablement. Intervention Functions are supported by the seven ‘Policy Categories’ in the outer rim of the ‘Wheel’ (Figure 5). (Michie explains that the word “Intervention Function” rather than “Intervention” was selected because particular intervention strategies may have more than one function).

I proceeded to map the findings from the barriers analysis, in a stepwise fashion, using the “Behaviour Change Taxonomy Version 1” (Michie et al., 2013). The barriers analysis had produced a ‘behavioural diagnosis’. From this, each finding was mapped through the TDF domains and COM-B categories (in the hub of the BCW) to the Intervention Functions contained in the middle ring of the Behaviour Change Wheel. As specific interventions were identified from the analysis, the component Behaviour Change Techniques, the building blocks that constitute each Intervention Function, were selected from the Taxonomy of 93 items as discussed below. The focus of our efforts was to identify the interventions likely to be effective at changing the behaviour of staff working in general practice (because I did not have access to policy levers in the outer ring of the ‘Wheel’). Of the nine

Intervention Functions to consider, all but ‘Restriction’ and ‘Coercion’ were relevant and could potentially be implemented as part of an intervention directed at general practice.

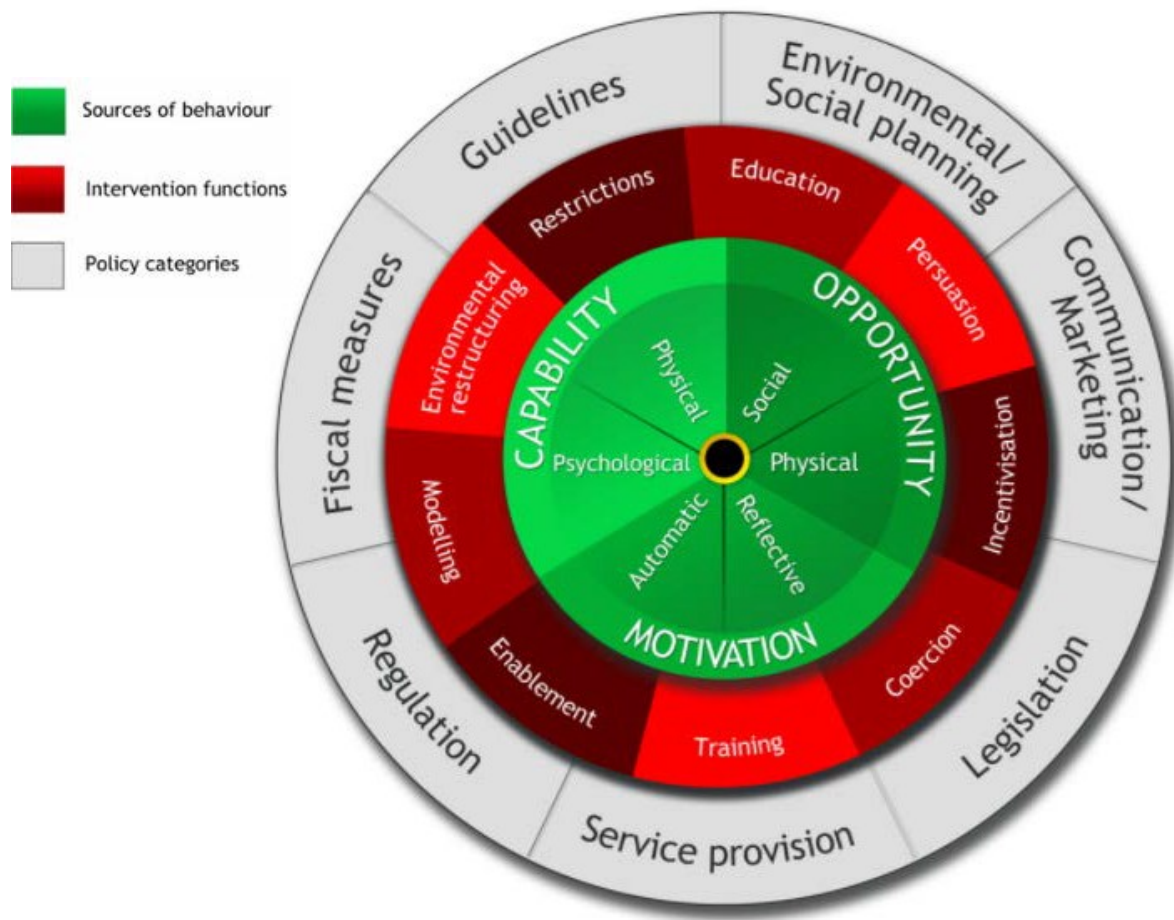


Figure 5. Behaviour Change Wheel (Michie et al. 2011) (with permission)

The next step was to ascertain specific intervention *content* by systematically considering which Behaviour Change Techniques could apply. The characteristics that constitute a ‘Behaviour Change Technique’ are that it is an “observable, replicable and irreducible component of an intervention designed to change behaviour and a postulated active ingredient within the intervention” (Michie, Atkins, & West, 2014). The 93 Behaviour Change Techniques in the Taxonomy are organised into 16 groups, with definitions and illustrative examples, to help researchers determine the content of their interventions. Each candidate Behaviour Change Technique was therefore considered, within each

category of Intervention Function, as a potential technique to overcome the particular barrier uncovered (Table 4). This labour-intensive process required extensive familiarization with the Taxonomy and considerable judgement, as component-Behaviour Change Techniques were repeatedly deliberated over. Decisions were guided by the steps in the “Guide” (Michie et al., 2014) and reached pragmatically with local knowledge of acceptability to end users.

Three specific examples of ‘mapping’, extracted from Table 4, are detailed below to provide insight into this process.

One barrier I found was, GPs said they sometimes could not remember developmental milestones – the typical developmental progression and acquirement of new skills according to age. This maps to the domain of ‘Memory’ in the TDF, and (Psychological) ‘Capability’ in COM-B. Selecting from the list of nine Intervention Functions, additional ‘Training’, ‘Enablement’ and ‘Environmental restructuring,’ using tools like PEDS, could augment memory and decision making. In this situation I would employ the Behaviour Change Techniques: Instruction how to perform, Behaviour practice/rehearsal, Conserve mental resources, Restructuring the physical environment and Adding objects to the environment.

A second example of a barrier was: the outcomes of a screening process and referral pathways were regarded as important and needed to be significant for practitioners to invest their energies in screening. GPs criticised the inadequacies of early intervention services available post referral, citing the example of one hour of play therapy per week as an early intervention for children with autism. This barrier maps to the domain of ‘Beliefs about Consequences’ in the TDF and ‘Motivation’ in COM-B. I would select Intervention Functions ‘Education’, ‘Persuasion’ and ‘Modelling’, as pertinent. Two of the Behaviour Change Techniques I identified were: ‘Feedback on the outcomes of the behaviour’ and ‘Information about health consequences (for the child)’. The method I decided to employ to counteract the belief, which would operate through ‘Persuasion’, used the narrative of an authentic, persuasive message established by the Frameworks Institute (FrameWorks Institute, 2009). The “Early Child Development Story” builds a narrative framework to effectively communicate

“unite and excite” practitioners about early child science and demonstrates the value of early intervention (FrameWorks Institute, 2009).

A third barrier arose from PNs’ descriptions of their experiences discussing sensitive issues with parents. Discussing a child’s weight status or a developmental delay was consistently described as a sensitive issue that risked offending the parent, potentially disengaging them from preventive healthcare. This caused PNs to feel anxious, and they requested instruction regarding how to *frame* discussions about weight. This situation demonstrates the interactions between ‘Beliefs about capabilities’, ‘Beliefs about consequences’ and PN ‘Emotions’ that affected their ‘Interpersonal skills’. A systematic review, that researched adherence to guidelines in pregnancy, also found the domain ‘Beliefs about consequences’ was a key barrier to weight identification and communication, that also operated through midwives’ ‘Emotions’ and ‘Beliefs about capabilities’ (Heslehurst et al., 2014). Our intervention therefore included modelling this scenario as part of the training with PNs. For reception staff it also included role playing “What to say to parents when handing out the PEDS questionnaire”, to overcome potential negative emotions as they were asked to extend their role beyond clinical administration.

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Table 4. Developing the Intervention: Mapping the Evidence

Evidence	TDF	Intervention Functions	Behaviour Change Techniques
Capability			
PNs did not know how to do HKCs (until they had received training)	Knowledge	Education	2.2 Feedback on behaviour 5.1 Information about health consequences (for children)
GPs did not always know how to assess social and emotional health & overall development of this age group	Knowledge	Education	2.2 Feedback on behaviour 5.1 Information about health consequences (for children)
GPs did not always remember how to assess overall development of this age group	Memory	Training Enablement Environ restructuring	4.1 Instruction how to perform 8.1 Behaviour practice/ rehearsal 11.3 Conserve mental resources 12.1 Restructuring the physical environment 12.5 Adding objects to the environment
GPs conducting HKCs were uncertain about which tests to use and how to do them E.g. Assessments of vision, hearing & screening social and emotional health	Physical skills	Training	4.1 Instruction how to perform 8.1 Behaviour practice/ rehearsal
PNs wanted training and regular updates on skills required for HKCs	Physical skills	Training	2.2 Feedback on behaviour 4.1 Instruction how to perform 8.1 Behaviour practice/ rehearsal 8.6 Generalisation of a target behaviour 8.7 Graded tasks
PNs did not know how to manage potential parent hostility if they raised the possibility of an abnormality in their child's development.	Interpersonal skills	Training	2.2 Feedback on behaviour 4.1 Instruction how to perform 8.1 Behaviour practice/ rehearsal 10.4 Social reward

Precise method to deliver HKCs was unspecified leading to perception of variability in quality of HKCs	Behavioural regulation	Education Training Modelling Enablement	1.4 Action planning 2.2 Feedback on behaviour 4.1 Instruction how to perform 6.1 Demonstration of behaviour 12.5 Adding objects to the environment
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Physical environmental opportunities

Equipment barriers	Environmental context and resources	Environ restructuring Enablement	12.1 Restructuring the physical environment 12.5 Add objects to the environment
Supportive health promotion brochures	Environmental context and resources	Environ restructuring Enablement	12.1 Restructuring the physical environment 12.5 Add objects to the environment
Information technology support e.g. recall systems, age prompts	Environmental context and resources	Environ restructuring Enablement	7.1 Prompts/ cues 12.1 Restructuring the physical environment 12.5 Add objects to the environment
Space in clinic to accommodate the examinations for the HKC	Environmental context and resources	Environ restructuring Enablement	1.2 Problem solving 12.1 Restructuring the physical environment

Social environmental opportunities (at the practice level)

Employing a PN is significant in being able to offer HKCs	Social influences	Environ restructuring Modelling Enablement	9.2 Pros and cons 9.3 Comparative imagining of future outcomes 12.2 Restructuring the social environment
Regular medical contact with children, including vaccination services	Social influences	Environ restructuring Enablement	1.2 Problem solving 7.1 Prompts/ cues 12.2 Restructuring the social environment

Having a HKC Champion- usually a GP or PN who make individual efforts to promote delivery of HKCs	Social influences	Modelling Enablement	1.1 Goal setting (behaviour) 1.4 Action planning 6.1 Demonstration of behaviour 8.6 Generalisation of target behaviour 8.7 Graded tasks 13.1 Identification of self as role model 13.2 Framing/ reframing
The professional mix in the practice influences overall promotion of preventive healthcare	Social influences	Environ restructuring Enablement	12.2 Restructuring the social environment
Having a member of staff responsible for managing a recall and booking system	Social influences	Environ restructuring Modelling Enablement	1.2 Problem solving 7.1 Prompts/ cues 4.1 Instruction how to perform 6.1 Demonstration of behaviour 12.1 Restructuring the physical environment 12.2 Restructuring the social environment
Competing interests of practice population healthcare needs	Social influences	Restriction Environ restructuring Enablement	1.1 Goal setting (behaviour) 1.2 Problem solving 1.4 Action planning 9.2 Pros and cons 9.3 Comparative imagining of future
Practitioners had insufficient time	Social influences	Restriction Environ restructuring Modelling Enablement	1.1 Goal setting (behaviour) 1.2 Problem solving 1.4 Action planning 6.1 Demonstration of behaviour 9.2 Pros and cons 9.3 Comparative imagining of future

Social environmental opportunities (outside the practice)

“Healthy Start for School” Tax incentive encouraged attendance and parent requests	Social influences	Restriction Environ restructuring Enablement	
Medicare rebate	Social influences	Restriction Environ restructuring Enablement	1.3 Goal setting (outcome)
Low attendance rates for childhood vaccinations	Social influences	Environ restructuring Enablement	1.2 Problem solving 1.3 Goal setting (outcome) 1.4 Action planning 12.2 Restructuring the social environment 12.5 Add objects to the environment
Belief that general practice is in competition with other service providers	Social influences	Restriction Environ restructuring Enablement	1.2 Problem solving 12.2 Restructuring the social environment 13.2 Framing/ reframing

Motivation from professional role and identity

Developing the role of the PN in Australian general practice & personal drive for professional development	Professional role and identity	Education Persuasion Modelling	5.1 Information about health consequences (for children) 6.1 Demonstration of behaviour 6.2 Social comparison 6.3 Info about others approval 7.1 Prompts/ cues 9.1 Credible source 9.2 Pros and cons 9.3 Comparative imagining of future 13.1 Identity of self as role model
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Belief that MCHNs have ownership and expertise in preventive healthcare for young children	Professional role and identity & Beliefs about capabilities	Education Persuasion Modelling Enablement	1.1 Goal setting (behaviour) 6.1 Demonstration of behaviour 6.2 Social comparison 6.3 Info about others approval 13.1 Identity of self as role model
PNs expressed low levels of self-confidence with some of the components of the HKC	Beliefs about capabilities	Education Persuasion Modelling Enablement	1.1 Goal setting (behaviour) 1.4 Action planning 2.2 Feedback on behaviour 6.1 Demonstration of behaviour 8.1 Behavioural practice and rehearsal 8.7 Graded tasks 10.4 Social reward 11 3 Conserving mental resources
GPs find process tedious and place HKCs as low priority (therefore delegate to PN)	Professional role and identity	Education Persuasion	5.1 Information about health consequences (for children) 6.2 Social comparison 13.1 Identity of self as role model 13.2 Framing/ reframing 13.5 Identity associated with changed behaviour
PNs preferred clear boundaries when delivering HKCs	Professional role and identity & Beliefs about capabilities	Education Persuasion Modelling Enablement	1.2 Goal setting (behaviour) 6.1 Demonstration of behaviour 6.2 Social comparison 6.3 Info about others approval 13.1 Identity of self as role model
HKCs used by some practitioners to develop professional expertise	Professional role and identity & Goals	Education Persuasion Modelling Enablement Incentivisation Coercion	1.1 Goal setting (behaviour) 1.2 Problem solving 1.4 Action planning 2.2 Feedback on behaviour 5.1 Information about health consequences (for children) 5.3 Info about social consequences (for practitioner) 6.1 Demonstration of behaviour

HKCs used by some practitioners to develop professional expertise (continued)

6.2 Social comparison
6.3 Information about others approval
8.6 Generalisation of target behaviour
8.7 Graded tasks
13.1 Identity of self as role model

Alternative model of developmental assessment with early childhood educators playing primary role

Professional role and identity

Education
Persuasion
Enablement

9.3 Comparative imagining of future
12.2 Restructuring the social environment

Motivation arising from outcomes

PNs more confident about their abilities were more satisfied (happier) doing HKCs

Beliefs about consequences

Education
Persuasion

5.6 Info about emotional consequences (practitioner)
13.1 Identity of self as role model

Outcomes and referral pathways are important to practitioners beliefs

Beliefs about consequences

Education
Persuasion
Modelling

2.7 Feedback on outcomes of behaviour
5.1 Info about health consequences (child)
9.1. Credible source
12.2 Restructuring the social environment
12.5 Add objects to the environment

GPs expressed low confidence with evidence behind HKCs

Beliefs about consequences

Education
Persuasion

5.1 Info about health consequences (child)
9.1. Credible source
13.2 Framing/ reframing

Belief that timing of HKC is too late for early intervention

Beliefs about consequences

Education
Persuasion

2.7 Feedback on outcomes of behaviour
5.1 Info about health consequences (child)
9.1. Credible source
9.2 Pros and cons
9.3 Comparative imagining of future
13.2 Framing/ reframing

Mode of delivery

Having completed the barriers analysis and mapped the evidence to ascertain specific Behaviour Change Techniques I could begin to conceptualise how this ‘Package’ of the intervention-ingredients could best be delivered. I could choose to deliver it ‘face-to-face’ – either individually or in groups – or ‘remotely’ via various technologies, individually or to whole populations of practitioners. I discounted the ‘remote’ modes of delivery because our intervention operated at the level of individual *behaviours* and had not researched the Policy Categories – Communication, Guidelines, Fiscal measures, Regulation, Legislation, Social planning and Service provision – located in the outer ring of the BCW.

Therefore, following guidance laid out in the Behaviour Change Wheel guide, I considered the evidence for the effectiveness, local relevance, practicality, affordability and acceptability (to public and professional groups) of the remaining face-to-face modes of delivery.

I considered the possibility of delivering an educational or networking forum under the auspices of a regional Medicare Local. In the US similar packages of interventions had been delivered face-to-face to *groups* of participants during educational meetings (Allen, Berry, Brewster, Chalasani, & Mack, 2010; King et al., 2010; Lannon et al., 2008; Margolis et al., 2008). These often lasted a day or more [one day (King et al., 2010), two days (Lannon et al., 2008), three days (Margolis et al., 2008)] and were backed by professional organisations (Paediatricians and Family Physicians), early intervention and public health services. Our study was considered to be much more preliminary (a pilot study) and I doubted I would be able to attract adequate numbers of representatives from all general practice staff (receptionists, GPs and PNs), for a period of time sufficient to deliver all of the required components of the intervention. In addition, because it had not been tested in Australia before, I considered there would be more flexibility to potentially modify the intervention if it was delivered ‘individually’.

I therefore opted to provide ‘face-to-face’ delivery of the intervention to individual practices, so that I could ensure all relevant groups were involved. The delivery of the intervention by a project nurse would be practical, affordable and ‘personalised’ to make it locally relevant to each practice. Recruitment would take place through the primary healthcare organisation. I was also encouraged that similar recruitment and delivery methods had proven successful in a previous intervention study that targeted adult preventive health (Harris et al., 2005). Our intervention required one nominated clinician to champion the delivery of the HKC backed by the practice team: the practice manager, reception staff and practitioners (GPs and PNs). A partnership was sought between Monash Department of General Practice and a Medicare Local (ML) to recruit a project nurse to deliver the intervention and to support the recruitment phase of the study. Flow diagrams depicting the recruitment phase and post recruitment conduct of the study were formulated (Figures 6 and 7) and an ‘Explanatory Statement’ of the pilot study was provided to members of the Medicare Local. The Monash University Ethics Committee gave approval for the study (Appendix 8).

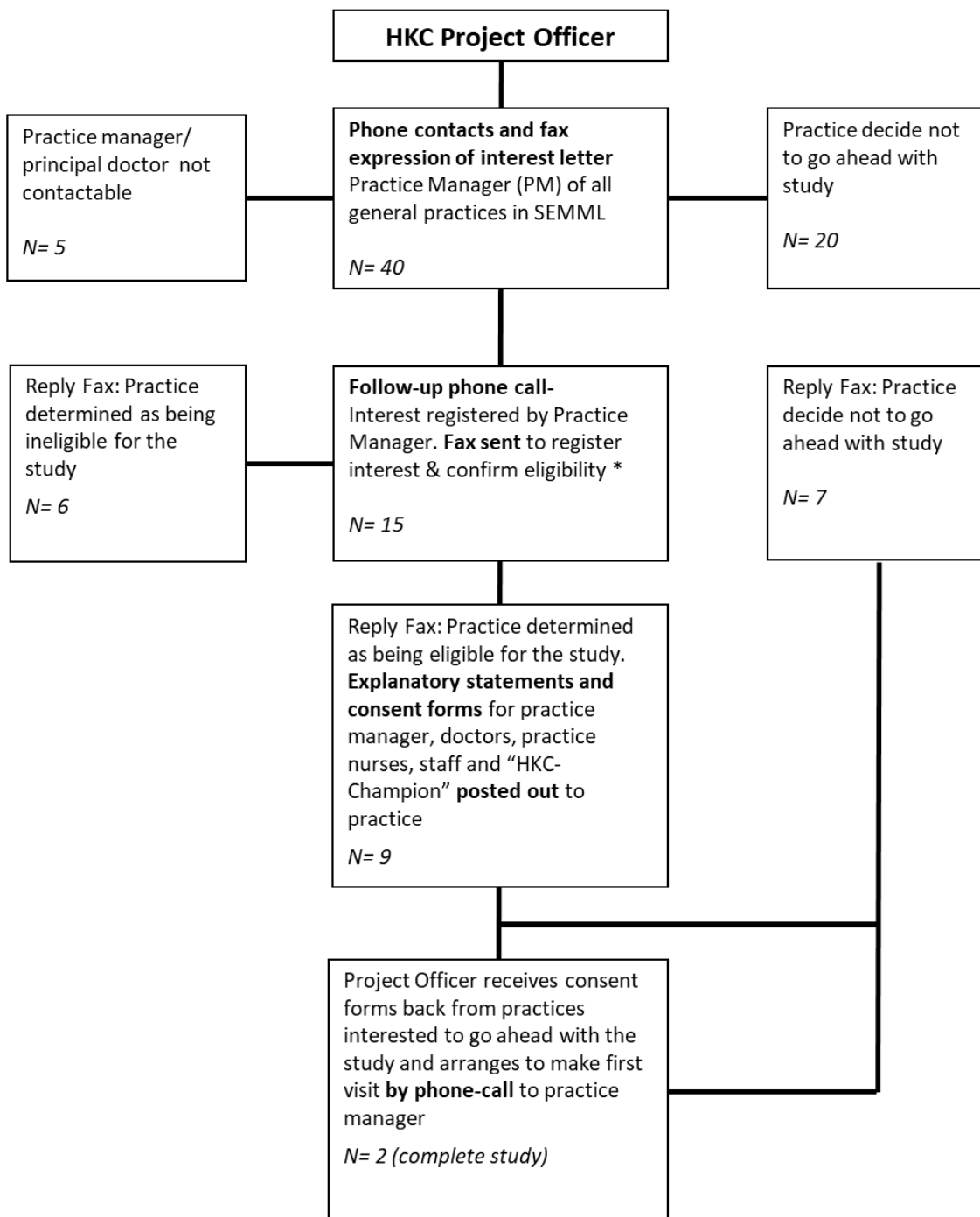


Figure 6. Protocol (presented to primary care organisation) for Study Recruitment

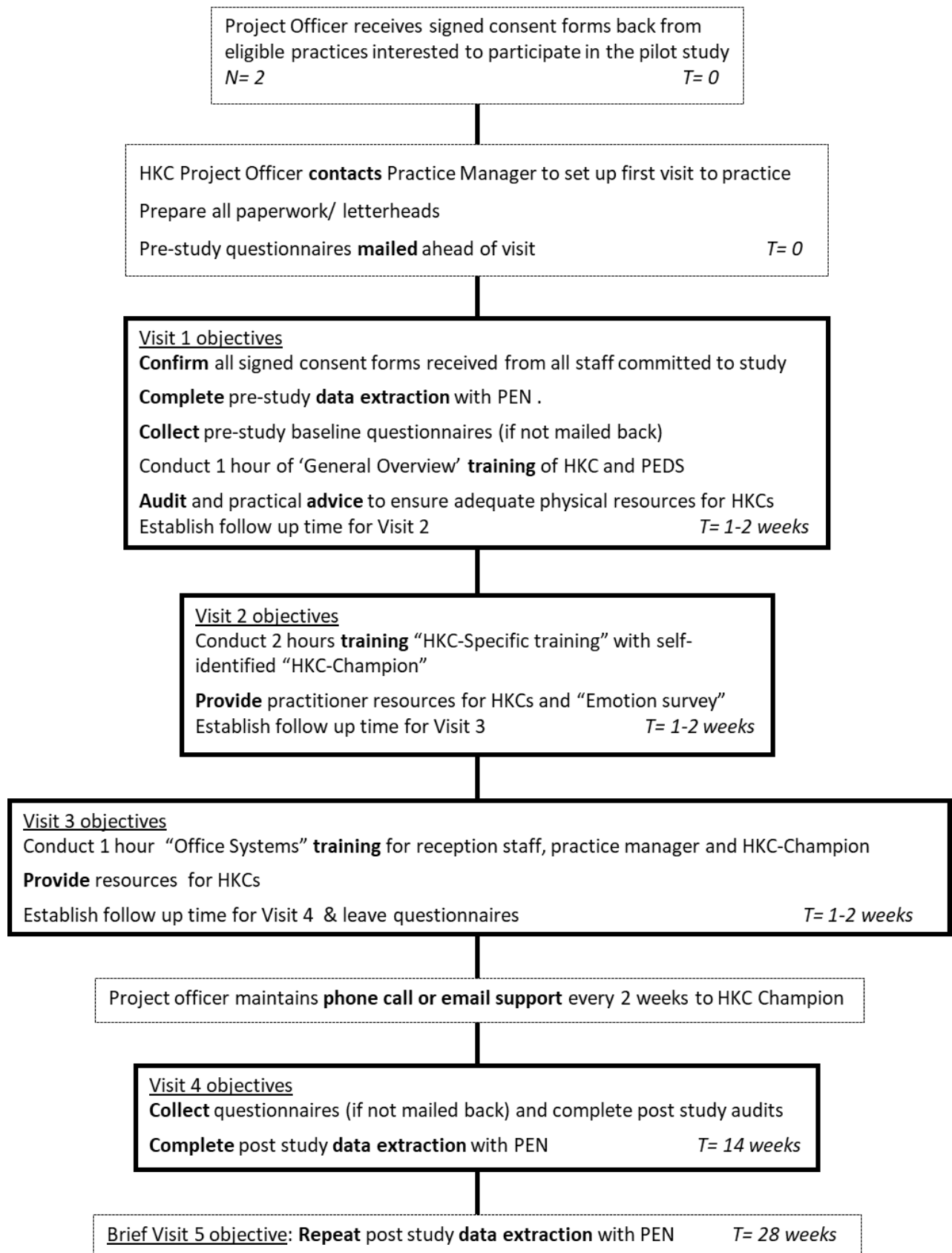


Figure 7. Envisioned flow diagram of Study Protocol following recruitment

Components of the Intervention design

I was beginning to envisage an intervention delivered face-to-face over the course of several visits. To build a detailed profile of the intervention, the Behaviour Change Techniques were categorised into four areas of content outlined below:

1. Training and education
2. Practical advice
3. Systems in general practice
4. Linking to the community

Training and Education

Training modules, approximately one hour duration, were developed to target reception and office staff, practitioners (both GPs and PNs) and the PN who nominated to provide the HKCs, the “HKC-Champion”. Reception staff and the practice manager- received advice about appointment systems and a business model, and role-played ‘what to say when handing PEDS to the parent’. GPs and PNs were trained on the importance of parent concerns, correct measurement techniques, the use of PEDS, how to interpret PEDS scores and determine the next step. Education and training to identify young children with dental caries, utilised the Lift the Lip tool (South Australia Health n.d.). This provides a visual reminder that dental caries first appears in the outer surface of the upper teeth, so lifting the child’s lip (or asking the parent to do so) will most likely demonstrate this. Information about this tool was provided to practices in the publication “How to perform a Healthy Kids Check” (Alexander and Mazza 2010). HKC-Champions were trained how to score and incorporate PEDS into the HKC, and how to perform each of the mandatory HKC components, with modules personalised to the individual needs of the nurse, lasting 1-2 hours.

Additionally, a concise, but inspirational, story developed by the ‘Frameworks Institute’ was adapted and presented during training to motivate reception and clinical staff towards the importance of early childhood development (FrameWorks Institute, 2009). The ‘Story’ describes how a child’s brain ‘architecture’ is built from a secure base, by positive “serve and return” interpersonal relationships (“like a game of tennis between child and adult”) and encourages specific communities (in this case, general practice) to adapt this message to

support the child within the family.

The Project officer was available by phone, for any queries that arose during the study, for the entire duration of the study (six months).

Practical Advice

Practices were provided with 'Equipment and process inventories' to record how practically-prepared they were for the respective components of HKC examinations. Advice regarding sourcing equipment and problem solving, to enable HKC completion, was offered. A PEDS pack, containing 50 questionnaires, score and interpretation forms, was supplied to each practice.

Systems in general practice

Practices were advised to establish recall and reminder systems to identify families with children in the correct age group and correctly schedule HKC appointments to allow sufficient time for the examinations and accompanying immunisations. Templates for all potential correspondence were provided and PEDS processes were discussed in detail so that correct procedures were in place and supplies of questionnaires and score sheets could be maintained.

Linking to the community

A tailored '*Community Resources Folder*' that contained the contact details of local paediatric, early intervention and community services was provided in an electronic format. This also contained parent tip-sheets, websites and a number of freely available 'secondary' developmental screens [e.g. the Pediatric Symptom Checklist (Jellinek & Murphy, 1988)]. Folders were installed onto practitioners' computerised desktops to increase accessibility.

Data collection

The study protocol was beginning to take shape. Children eligible for HKCs could be identified by their age. There was a requirement that each child would receive a preschool immunisation and

specific examinations were mandatory as part of the HKC process. I needed to establish some potential measures to be able to evaluate the procedure. As an intervention study data collection needed to take place at baseline, three months post intervention (end of the active stage of the intervention) and at the conclusion of the project (six months). Our primary outcome measure was devised as the proportion of eligible children completing a HKC in the preceding 12 months. Secondary outcomes included the proportion of children having a BMI recorded (because this was the only data pertaining to the HKC that could be extracted using the PenCAT tool, see below), and changes to equipment and clinic-procedures could be captured using inventories. Practitioner's beliefs and attitudes would be measured using questionnaires before and after the intervention. These are described in the article that follows in Chapter 5.

PenCAT tool

To calculate the proportion of the practice population who were children in the age group of interest and the proportion of these children who had completed a HKC in the preceding 12 months the Pen Clinical Audit Tool (PenCAT) (North Western Melbourne Primary Health Network, n.d.) was used. PenCAT is a data extraction and clinical audit tool that has been widely applied and built upon in Australian general practice and related networks (North Western Melbourne PHN. (n.d.)). It extracts data from both clinical and billing systems in individual practices, and saves an extract onto the practice server. The data-set is then de-identified by software located on the server before secure submission to primary care organisations. Data can be analysed by the practice itself and/or the primary care team to assist population health, service planning, analysis and reporting. One feature of PenCAT allows practice staff to identify and report missing patient demographic and clinical data, active and inactive patient records (data cleansing). Training in the use of PenCAT was rolled out over several years supported by Divisions and Medicare locals.

To calculate the number of patients considered regular attendees of the practice the RACGP defines an 'Active Patient'- as 'a patient who has attended the practice/service *three or more times in the past two years*' (Royal Australian College of General Practitioners, 2015). However, children under the age of five, who arguably get sick more commonly than older children and adults, are less likely to be termed 'active' for a host of reasons: young age, less years to attend; may have attended alternative

services (e.g. MCHN or local council for vaccination services); may have a number of GPs depending on family relocation, frequency and timing of sickness; and use of after-hours services. In our research with parents they told us they attended more than one GP with their children, and often sought out bulk-billing practitioners for illnesses deemed more straight-forward, to avoid out-of-pocket costs (e.g. ear infections). I considered these factors and concluded that this could potentially increase the number of 'inactive' child-patients, the denominator by which services are compared e.g. immunisation rates per practice population. The number of children who have attended *once or more in the last 12 months* was used in a US study of vaccination rates (Morrow et al., 2000) and this was therefore chosen as the definition for our study.

Participant Questionnaires

Pre and post intervention questionnaires were designed to evaluate beliefs, attitudes and experiences regarding preventive healthcare and HKCs. All questionnaires gathered basic information about the practitioner and their practice, and were tested for face and content validity with a group of GPs and primary care researchers in the Department of General Practice at Monash University (Appendix 9). Fifteen questions targeted clinicians' beliefs and attitudes regarding preventive healthcare in general and young children in particular. Questions were designed to elicit whether clinicians who held an overall positive disposition towards preventive health, were also predisposed towards preventive healthcare for young children, including HKCs and measuring BMI. Attitudes regarding the use of BMI according to the age of the child were also sought because although guidelines recommend using BMI from two years of age (National Health and Medical Research Council, 2013) it was known that some practitioners believed this measure to be imprecise below the age of four years (August et al., 2008) and therefore might be reluctant to apply it to younger age-groups (van Gerwen, Franc, Rosman, Le Vaillant, & Pelletier-Fleury, 2009). Two questions differentiated between administering a HKC at 3.5 years (the youngest age a child would be eligible for a HKC) and administering it at 4.5 years, to look for potential discomfort performing health checks with younger age-groups of children. Two questions attempted to distinguish between clinicians' self-efficacy performing a health check *with* versus *without* standardised developmental screening tests. The final question examined practitioners' self-efficacy elucidating the risk factors for Autism, an area of knowledge that some

practitioners lacked in the focus group discussions.

A job satisfaction questionnaire, chosen for its concise format and previous use in general practice (Goetz et al., 2011), was incorporated into a questionnaire to capture the experiences of professionals working to deliver the HKC intervention (Warr, Cook, & Wall, 1979). These ten questions sought to uncover unforeseen negative effects caused by introducing HKCs that may have impacted job satisfaction.

A self-evaluation form was designed to assess confidence delivering each of the components of the HKC, personal satisfaction ratings and outcomes (referrals) of the HKC. A one page pre-, post-training questionnaire [adapted from the “Assuring Better Child Health and Development” project (Earls et al., 2009)] was also designed to evaluate the educational component of the intervention.

Implementation status questionnaire and Equipment inventory

I needed to devise a measure of the potential impact of the intervention if, following delivery of the intervention, a practice made improvements to their procedures and/or equipment. Equipment inventories, as process-evaluation measures, were derived from US research (Lannon et al., 2008) and adapted to the context of HKCs. One ‘grid’ recorded whether items of equipment were already present in the practice at baseline or whether the intervention prompted the practice to obtain the necessary equipment. A second form considered five options regarding whether various procedures (e.g. recall procedures) were in place in the practice-environment before or after the intervention (already in place; planning to try; testing; begun on a pilot basis; using routinely) (Appendices 10 and 11).

Parents’ Evaluation and Developmental Status (PEDS)

The inherent difficulties of finding a suitable tool that can accurately classify a child as either developmentally normal or developmentally delayed, within the time constraints of primary care, has led to the use of parent-completed tools. Parents, as ‘experts of their own child’, can streamline structured developmental surveillance by capitalising on the opportunities observant parents have to compare their child alongside others. One such tool that has been extensively evaluated is the “Parents’ Evaluation of Developmental Status”, or PEDS tool (Glascoe, 2000b; Woolfenden et al.,

2014) (Box 5). This consists of ten yes/no questions pertaining to child development that have been written to a grade 5 (age 11 years) reading level. Parent responses are transferred onto a scoring sheet that categorises developmental concerns as either “predictive” or “non-predictive” of developmental delay, and a series of decision pathways are recommended according to the scores. Decision pathways circumvent clinicians’ opting to ‘watch and wait’ for developmental progress and increases the rate at which a child is referred. The validity of PEDS [sensitivity of 91-97 per cent and specificity of 73-86 per cent (Glascoe, Marks, Poon, & Macias, 2013)] is comparable to other parent-instruments, and its simplicity makes it ideal for child surveillance in general practice. PEDS has been extensively researched (Schonwald et al., 2009; Woolfenden et al., 2014), is validated for use in Australia, and is widely utilised by MCHN and child care facilities (Coughlan, King, & Wake, 2003).

Box 5. Parents’ Evaluation of Developmental Status (PEDS) questionnaire	
Please list any concerns about your child’s learning, development and behaviour	
Do you have any concerns about how your child:	
Talks and makes speech sounds	Understands what you say
Uses his/her hands and fingers	Uses his/her arms or legs
Behaves	Gets along with others
Is learning to do things for himself/herself	Is learning preschool/school skills
Please list any other concerns	

Other resources

Our research had discovered that the outcomes of HKCs were important to practitioners. Therefore I supplied a collection of practice resources (community resources, suggested referral pathways and parent tip sheets, on a USB memory-stick) to support the next step. These were given to each practice with the suggestion that information could be downloaded onto the desktop of each practitioner. Each collection of resources was tailored to the local practice area so that practitioners could readily access information about local services e.g. optometrists, to aid the follow through of problems identified by HKC examinations. Other resources (that did not require tailoring) included parent tip sheets to cover the common behavioural problems experienced by parents of children in this age group (e.g. fussy eating) (Appendix 12) and publically available secondary level screening questionnaires with a suggested algorithm (Appendix 13).

Chapter 5. Piloting the Intervention

To pilot the intervention I needed to test it with a small number of general practices. Support for the project was sought from the Chief Executive Officer of the primary health organisation that had been involved in the stakeholder group. This Medicare Local had endorsed 'Early Childhood Development' as a key health priority due to a higher than average resident population of children under four years of age, with higher levels of developmental vulnerability (Department of Health and Ageing, 2012). The area included Dandenong, a region with high CALD communities and low socioeconomic status, one of the original three 'Division' areas from which I recruited the parents and practitioners for our primary research. The Medicare Local agreed to enlist a project officer, a registered nurse who was already delivering vaccination support services to general practices in the catchment.

Reflexivity

As I delivered the intervention I was reminded of the relatively low priority GPs give the research process due to the necessary demands of clinical practice. Initially, it was conceived that the GP-researcher could remain at 'arms-length' from the actual delivery of the intervention, but the experienced research nurse, who had a long history of working with GPs at the primary care organisation, indicated that peer-to-peer training would likely be received more favorably. Despite obtaining an appointment within the 'lunch-break' of the four GPs that day (and providing refreshments) doctors joined the meeting haphazardly and, as a consequence, only received part of the educational presentation. Levels of personal interest and time available for the project varied for GP and Nurse practitioners and from that experience I learnt to 'cut to the chase' and repeatedly deliver the *core* components of the presentation. Whilst the project was not at all onerous for the GPs, having GP-support was critical and particularly dependent on views of the principal doctors. On reflection, for GPs, a succinct presentation of one of the core components of the intervention, the PEDS questionnaires, would have sufficed on the day and (with more funding) an on-line delivery of the remaining educative component would have enabled access outside of practice hours. Unfortunately,

this still does not guarantee that all practitioners would complete the education module. This remains one of the largest obstacles to the uptake of any intervention or new way of working in general practice (Parkinson et al., 2015).

RESEARCH ARTICLE

Open Access



The challenges of trying to increase preventive healthcare for children in general practice: results of a feasibility study

Karyn E. Alexander*, Bianca Brijnath and Danielle Mazza

Abstract

Background: In Australia, general practice, the linchpin for delivery of preventive health care to large segments of the population, provides child-immunisation and preventive health alongside government services. Despite this, less than half of eligible children complete a Healthy Kids Check (HKC), a preschool preventative health assessment available since 2008. Using a rigorous theoretical process, the barriers that affected delivery and reduced general practitioner and practice nurse motivation to provide HKCs, were addressed. The resulting multifaceted intervention, aimed at increasing the proportion of children receiving evidence informed HKCs from general practice, was piloted to inform a future randomised controlled trial.

Methods: The intervention was piloted in a before and after study at three sites located southeast of Melbourne, between February and October 2014. The HKC-intervention involved: 1) Delivery of training modules that motivated reception and clinical staff by delivering key messages about local prevalence rates and the “Core Story of Child Development” 2) Practical advice to prepare clinics for specific HKC-examinations 3) Workflow advice regarding systems that included all staff in the HKC process, and 4) Provision of a “Community Resources Folder” that enabled decision making and referrals. A major component of the intervention incorporated the promotion of structured developmental screening by the practice team using Parents’ Evaluation of Developmental Status.

Results: Twenty of 22 practitioners and practice managers agreed to join the study. Post-training questionnaires showed participants had developed their skills working with young children as a result of the training and all respondents believed they had successfully implemented standardised HKC services. Post intervention proportions of children completing HKCs significantly increased in two of the practices and quality improvements in HKC-processes were recorded across all three sites.

Conclusion: This pilot study confirmed the feasibility of delivering a multi-faceted intervention to increase HKCs from general practice and demonstrated that significant quality improvements could be made. Future studies need to extend the intervention to other states and research the health outcomes of HKCs.

Keywords: Pilot study, Complex intervention, General practice, Preventive health care, Child health, Healthy Kids Check

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Background

In Australia, Child and Family Health Nurses (CFHNs) play a key role providing universal, government funded, preventive health to young children, administered at local government level [1]. Despite this, services remain fragmented, the result of divergent policy frameworks established by the eight federated states and territories [1], so that less than 60 % of families complete a pre-school visit [2]. In response to persisting child development and health issues, the Australian government introduced the Healthy Kids Check (HKC) into general practice, in 2008, and made a family tax benefit contingent on receipt of a pre-school check [3]. The HKC is a one-off health assessment, available to children (aged 3.5 to 5 years) completing pre-school vaccinations (with any GP or local government services) (Table 1) [4]. Parents can, therefore, choose not to receive CFHN services and may obtain a HKC from GPs in the private sector. Overall, less than half of eligible children complete a HKC, with wide variability across jurisdictions, from a low of approximately 22 % in Victoria (where CFH services are arguably the most developed [5]), to a high of approximately 66 % in Queensland [6]. Our previous research found that HKC delivery is hampered by a combination of practitioner, environmental and system barriers that combine to reduce motivation [7]. The findings aligned with barriers of ‘insufficient time’ and ‘a lack of community resources’ uncovered in a survey of GPs in Victoria, prior to rollout of the HKC, when delivery of preventive healthcare during ‘sick-child’ consultations was another principal concern [8].

Primary care based interventions focussing on increasing child preventive health services (excluding immunisation) are relatively sparse but have previously tested: the feasibility of an intervention in general practice to prevent child-obesity [9], an oral health intervention [10] and Autism screening amongst CFHNs [11]. In each study the design of the intervention was informed by the barriers identified in previous research [10, 11] or a needs analysis [9] and incorporated training and facilitated referral

pathways. In the United States (US), systematic reviews of paediatric primary preventive health interventions have also considered screening for lead poisoning, anaemia and tuberculosis, developmental problems, vision, hearing, and blood pressure. Interventions were generally multifaceted, combined education and training with audit and feedback, included environmental modifications (e.g. clinical decision making aids) and improving office support systems [12, 13]. These interventions suggest potential solutions relevant to the Australian context and to our intervention pilot targeting the HKC.

Aims

The study aims to test the feasibility of an evidence-based complex intervention designed to increase the proportion of children aged 3.5–5 years (target age group) receiving HKCs. Secondary aims are to increase the proportion of eligible children having a body mass index (BMI) recorded and increase GP and Practice Nurse (PN) self-efficacy administering HKC services.

Methods

Overview

This was a 6 month pilot of a “whole-of-practice” intervention, delivered to three general practices. Quantitative methods, pre- and post-implementation, tested the feasibility and impact of the HKC-intervention on staff beliefs, attitudes and behaviours, and measured components of practice activity. The study was approved by Monash University Human Research Ethics Committee. Written informed consent was obtained from all study participants.

Setting and participants

Implementation of the intervention took place between February and October 2014 at sites located in the catchment of a single regional primary healthcare organisation (PHO), southeast of Melbourne. Practices served predominantly urban populations in a region experiencing rapid growth with pockets of high social disadvantage [14] and high levels of child developmental vulnerability [15]. Practices were recruited via an advertisement placed in the electronic newsletter of the PHO (158 practices). The project nurse, who also worked to support vaccination services in the catchment, encouraged enrolment into the study. To be eligible, practices had to provide vaccination services to children and propose key personnel- a GP or PN “HKC-Champion” and a practice manager- to drive the intervention and liaise with clinical and office practice staff.

Design of the intervention

The intervention was constructed following the UK Medical Research Council guidance [16] in an iterative process that applied a behaviour change model [17]. The

Table 1 Mandatory and non-mandatory components of the Healthy Kids Check

Mandatory ^a	Non-mandatory
Height	Discuss eating habits
Weight	Discuss physical activity
Eyesight	Speech and language development
Hearing	Fine motor skills
Oral health	Gross motor skills
Question toilet habits	Behaviour and mood
Note Allergies	Other examinations as necessary

^aMandated by Australian government, endorsed by Royal Australian College of General Practitioners [34]

Behaviour Change Wheel, a tool for systematically designing and evaluating behaviour change interventions, mapped the barriers and facilitators uncovered in our qualitative exploratory work, to specific interventions that could be used to target those factors. Since multiple factors operated to impede the delivery of the HKC, a multi-faceted intervention was required. The intervention included: Education and skills training addressing lack of knowledge about specific components of the HKC and how to communicate sensitive findings to parents (e.g. child-overweight and developmental delay); attending to equipment and space requirements; using a team-based model of care to address time and staffing barriers; and provision of evidence based tools and pre-formulated pathways of care to overcome negative beliefs about the outcomes of HKCs. The intervention was determined following consultation with a stakeholder group.

A significant component of the HKC-intervention was the introduction of the Parents' Evaluation of Developmental Status (PEDS) questionnaire [18], a tool used to assess child development, validated and widely used by CFHN services in Australia. PEDS was selected because it elicits parent concerns, applies to children of pre-school age and is completed, scored and interpreted in 2–5 minutes, making it an ideal choice for general practice. The HKC-intervention was divided into four areas of content:

- A. *Three training modules* that opened with "The Core Story of Child Development" [19] and information about local prevalence rates of child health problems [15] aimed at motivating participants. In addition:
 1. Reception staff and the practice manager- received advice about appointment systems and a business model, and role-played 'what to say when handing PEDS to the parent'.
 2. "HKC - Champions" were trained how to score and incorporate PEDS into the HKC, and how to perform each of the mandatory HKC components
 3. GPs and PNs were trained on the importance of parent concerns, correct measurement techniques and how to interpret PEDS scores and determine the next step.
- B. *Practical advice* that began with 'Equipment and process inventories' to record how prepared clinics were for HKCs. Advice directed clinics towards sourcing equipment and problem solving to enable HKC completion. A PEDS pack, containing 50 questionnaires, score and interpretation forms, was supplied to each practice.
- C. *Systems advice* established how to set up recall and reminder systems, schedule HKC appointments and maintain supplies and workflow using PEDS.

D. *An electronic 'Community Resources Folder'* that contained the contact details of local paediatric, early intervention and community services, parent tip-sheets, websites and a number of freely available "secondary" developmental screens (e.g. the Pediatric Symptom Checklist [20]). Folders were installed onto practitioners' computerised desktops to increase accessibility.

Procedure

Six visits were planned for each practice, five within the first 3-month 'active intervention' phase. The project nurse obtained consent, delivered questionnaires and the education and training modules (3 visits), assisted with equipment and process inventories (Table 2), extracted data (3 visits) and offered advice. She was supported by one of the researchers (KA), a general practitioner with expertise in preventive health of preschool children, whose role was to deliver peer-group clinical training (module 2).

The HKC procedure was as follows: On arrival, office staff handed a PEDS questionnaire to the parent, to complete in the waiting room. This was scored by the practice nurse at the outset of the HKC-consultation so that the HKC was tailored to parent concerns. Body Mass Index (BMI) was calculated and interpreted following accurate measurement of height and weight. Uni-ocular visual acuity was assessed, and corneal light reflection and cover tests examined for strabismus. Oral

Table 2 Inventory of Practice Equipment and Processes used for HKCs

Quality indicator	Description
Office systems	Uses a recall or reminder system to invite or identify eligible children
	Has a process in place to deliver PEDS ^a to parent in waiting room
Equipment	Has a list of referral sources (e.g. paediatricians) accessible to all clinicians
	Balance-beam or electronic scales (measure to nearest 0.1 kg)
	Fixed or correctly placed tape stadiometer (measure to nearest mm)
	BMI calculator (age and gender specific)
	Visual acuity (VA) chart suitable for pre-school children
Examination method	VA chart correctly placed (according to chart-type, 3 m or 6 m)
	Uses standardised developmental screening tool (e.g. PEDS ^a) as part of HKC
	BMI calculation and interpretation
	Tests uni-ocular vision (patches or covers the eye adequately)
	Applies "Lift-the-Lip" tool correctly

^aPEDS = Parents' Evaluation of Developmental Status

health was assessed using the “Lift the Lip” tool [21]. Other mandatory components of the HKC were completed by direct questioning (Table 1). Where possible, parent concerns were addressed using parent tip-sheet resources. The business model proposed that each HKC, including PEDS interpretation, would be signed off by a GP, so that the parent could claim a Medicare rebate commensurate with time taken (and rebated more highly than the nurse-only HKC item). In the event that a developmental or health problem was discovered, practitioners could access additional resources provided in the electronic folder. A request was made for PEDS forms to be de-identified and returned to the research nurse to analyse concerns identified by parents.

Measurements

A significant component of measurement utilised the Pen Computer System Clinical Audit Tool (PCS CAT) [22]. This tool has been widely implemented by PHOs to analyse practice population, Medicare and some clinical data. BMI is the only clinical output of the HKC recorded by the PCS CAT, but it is not exclusive to the HKC. Practitioners’ anthropometric measures, as part of routine child health care, would also be recorded by the PCS CAT. Practitioner questionnaires used 5-point Likert scales to assess beliefs and attitudes to prevention (11 questions) and self-efficacy (9 questions) across all age groups, including child health items about HKCs, developmental assessment and autism screening (Table 3). Questionnaires were tested for face validity. Training modules were also evaluated using brief questionnaires (Table 4). Practice inventories, adapted from surveys used in US-based research [23], recorded equipment and processes used by the practice during HKCs.

Baseline data included: The number of eligible-age children (aged between 3.5 and less than 5 years) as a proportion of the total “active” practice population (attended at least once in the previous 12 months), the number of HKCs completed in the previous 12 months, and the proportion of eligible children with a BMI recorded. Data, including numbers of age-eligible children and total practice population, were viewed sequentially using the PCS CAT on practice computers at 3 and 6 months following intervention. Practitioner questionnaires and practice inventories were recorded at baseline and on a second occasion between 3 and 6 months following intervention.

Analysis

We calculated and compared the proportions of eligible children receiving a HKC and having a BMI recorded at baseline, 3 months and 6 months following intervention, using two proportion Z-tests. Median scores calculated from Likert scales of items testing practitioners’ beliefs,

confidence and training, were compared before and after intervention using Wilcoxon signed rank tests, in SPSS [24]. Scores of practice inventories were also analysed before and after intervention. PEDS forms were analysed for numbers of predictive and non-predictive problems identified.

Results

Recruitment

Of the six practices that initially expressed an interest in the study, two later declined and one practice proved ineligible because it did not conduct HKCs. All three enrolled practices were privately owned clinics and provided services for children with no ‘out of pocket fees’ (accepted the Medicare rebate as the entire fee) (Table 5). Practice C was notable in serving large populations of recent migrants. The project nurse made six visits to each practice, with an additional five visits to one practice due to scheduling and data extraction problems.

Participation

One practice nurse in each practice agreed to ‘champion’ the delivery of the HKC. Twenty of 22 practitioners (GPs and PNs) and practice managers attended a component of training (participation rate 91 %) but, due to time constraints, only 50 % GPs received the entire module. Ten GPs, 4 PNs, and 3 practice managers completed pre-post questionnaires. Reception-staff were invited to join the study (module 1) but were not requested to complete questionnaires.

Training

For those clinicians and staff that completed training evaluation ($n = 17$), knowledge about the administration of HKCs and PEDS screening and personal comfort associated with requesting parents to complete PEDS, increased [5 items. *Mdn* 49, vs *Mdn* 76, ($Z = 2.02$, $p .043$, $r = .90$)] (Table 4).

Practitioner questionnaires

At baseline, all practitioners held positive beliefs about the value of developmental assessment and early-intervention services and believed they played a significant role in adult preventive health. GPs and PNs were generally confident administering health assessments across all age groups, but three of the four PNs lacked confidence performing infant health checks, and one GP was less confident performing HKCs on younger children (<3.5 years) (Table 3).

Following intervention, 15 participants (94 %) believed the HKC- intervention had developed their skills working with young children, and all agreed that their practice had successfully implemented standardised HKC services.

Table 3 Questionnaire and frequency distribution of responses

Questions asked of Clinicians (N = 14)		Before HKC- intervention					After HKC-intervention				
For child preventive health:- Questions 1–6 = 'Beliefs' Questions 7–12 = 'Self-efficacy' (Adult preventive health items not included)		Strongly disagree	Disagree	No opinion	Agree	Strongly agree	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
1	I believe Early Intervention services are important in improving outcomes for children and families	0	0	0	3	11	0	0	0	3	11
2	I play a significant role in providing advice about vaccination	0	0	0	4	10	0	0	1	3	10
3	Our practice plays a significant role in providing vaccination services	0	0	0	4	10	0	0	0	4	10
4	I think it is important to calculate a BMI for school aged children	0	0	1	9	4	0	0	1	9	4
5	I think it is important to calculate a BMI for children aged 2 to 5 years	0	1	3	6	4	0	0	4	6	^b 4
6	I believe pre-school children should have their development assessed in general practice at every opportunity	0	0	1	6	7	0	0	0	8	6
7	I feel confident in my ability to conduct post-natal checks of infants	0	3	0	5	6	0	1	2	3	8
8	I feel confident in my ability to perform a Healthy Kids Check for a child aged 4.5 years	0	0	1	^a 9	4	0	0	1	6	7
9	I feel confident in my ability to perform a Healthy Kids Check for a child aged 3.5 years	0	1	1	8	4	0	0	3	4	7
10	I feel confident in my ability to detect developmental problems in pre-school children without the use of standardised developmental screening tests	1	1	5	5	2	0	2	4	6	2
11	I feel confident in my ability to use standardised developmental screening tests (e.g.PEDS) to help detect developmental problems in children < 5 years	0	0	6	7	1	0	0	2	9	3
12	I feel confident in my ability to detect the “red flags” for Autism in children under 5 years	0	1	4	7	2	0	1	3	7	3

^aMissing data adjusted to reflect no change from data obtained in post-intervention questionnaire^bMissing data adjusted to reflect no change from data obtained in pre-intervention questionnaire

Table 4 Training questionnaire and frequency distribution of responses

Questions	Pre-workshop					Post-workshop				
	Low		High			Low		High		
How would you rate your....			→					→		
1 Knowledge regarding how to access early intervention services for young children	1	5	7	3	1	0	0	2	6	9
2 Knowledge about which children are eligible for a Healthy Kids Checks	0	4	4	8	1	0	0	0	6	11
3 Knowledge about the item numbers associated with providing a Healthy Kids Check	2	4	1	6	4	1	1	2	4	9
4 Personal level of comfort asking parents to complete questionnaires about their child's development	3	4	6	4	0	0	0	1	5	11
5 Knowledge of standardised developmental assessments like PEDS	5	7	2	3	0	0	1	0	6 ^a	10

PEDS = Parents' Evaluation of Developmental Status

^aMissing data adjusted to reflect no change from data obtained in pre-intervention questionnaire

Overall, whilst practitioners maintained beliefs about child preventive healthcare [*Mdn* 64.0, vs *Mdn* 63.5, ($Z = 0.82$, $p = .414$, $r = .41$)], confidence in ability to perform HKCs and developmental assessments increased post-intervention [*Mdn* 54.0, vs *Mdn* 58.5, ($Z = 2.23$, $p = .026$, $r = .91$)].

Practitioners thought that it was important to calculate a BMI for adult patients and older children, however five practitioners (4 GPs and 1 PN) remained ambivalent about calculating BMI for children aged 2 to 5 years post-intervention. Post baseline questionnaires indicated that PNs rated either their role in the practice decreased in respect of another aspect of preventive health care (vaccination service delivery, screening for adult hypertension) or they felt less confident performing adult health checks. Our small sample size precluded subgroup analysis.

Participants were asked if they had accessed their desktop 'Community Resource Folder'. Ten practitioners responded that they had accessed parent tip-sheets, secondary developmental screens or referral pathways on one or more occasion (Fig. 1).

HKC uptake

Over the 6 months, the proportion of eligible children within the practice population did not significantly change until the 6 month data collection point: for practice A, the overall population declined to 82.6 % baseline and the proportion of eligible children appeared to fall (Table 6 and Fig. 2). Practice A completed 22, practice B, 34 and practice C, at least 15 HKCs. The proportion of children completing a HKC significantly increased in two of the practices over the course of the study (Fig. 3). Due to software incompatibilities we were unable to obtain baseline HKC numbers, so could not calculate a baseline proportion for practice C. The proportion of eligible children who had a BMI recorded also significantly increased in practice A and B, but appeared to decrease in Practice C (Fig. 4).

Inventories-Quality improvements

All practices improved their equipment and processes of HKC-delivery. A total of 5 improvements to office systems, 7 equipment improvements and 10 improvements

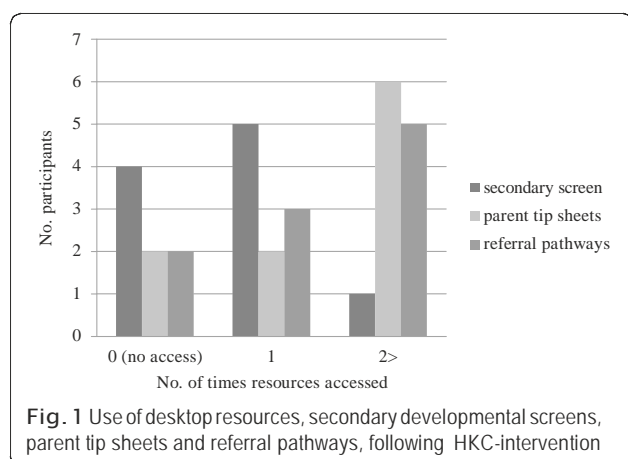
Table 5 Population, billing type, ownership and clinicians servicing practices A, B and C

Practice descriptor	A	B	C
SEIFA ^a	981	1003	939
AEDI ^b (%)	22.1	18.3	39.5
Practice population (baseline)	3950	9700	19750
Population eligible children (baseline)	575	1580	2600
Billing ^c	Mixed (some out-of-pocket fees)	Bulk billing only	Bulk billing only
Ownership	Privately owned	Privately owned	Privately owned
GPs	4	4	6
Practice Nurse	1	1	3

^aSocio-economic Index for Areas (SEIFA) has a national average of 1000 with increasing disadvantage as values decrease. SEIFA is a suite of four indexes that have been created from social and economic Census information. Each index ranks geographic areas across Australia in terms of their relative socio-economic advantage and disadvantage [10]

^bAEDI = Australian Early Developmental Index: Developmentally vulnerable on 1 or more domains- Victorian average 19.5 % [11]

^c'Bulk Billing' No out-of-pocket fees for the patient. All practices bulk billed HKCs



in examination methods (22 out of a total possible 24 improvements) across the three practices were made (Fig. 5) as detailed below:

i) Office systems

All practices stated they had an accessible list of paediatricians, allied health practitioners, early intervention and community services in place before the study. Although all three practices used recall systems for adult health checks, only one practice invited children for HKCs. Remaining practices trialled recall systems by study conclusion. Under guidance from the intervention, all practices implemented procedures to handout PEDS from the reception area with each HKC.

ii) Equipment

Access to measuring devices improved following implementation: One HKC-Champion ensured she used digital (rather than mechanical) scales and one practice corrected the placement of a tape stadiometer. A second practice was made aware of incorrect placement but had not re-placed it at study conclusion. HKC-Champions did not access paediatric BMI calculators until after the

intervention (see below). Visual acuity testing required a valid eye chart (appropriate for testing the target age group) to be placed at the correct distance from the subject. By study conclusion one practice had corrected chart-type and placement, but a second practice continued to use a chart without a scale.

iii) Examination methods

At baseline, although PCS CAT data implied that a proportion of children had a documented BMI, this proved to be an automated calculation based on adult categories of overweight. Direct questioning confirmed that BMI was not calculated or interpreted in the pre-intervention period by any of the HKC-Champions. At baseline, visual acuity was correctly assessed (uni-ocular) in only one practice and methods were adjusted by the intervention for the other two clinics. None of the practices utilised developmental screening tools before intervention and two out of three HKC-Champions did not use oral assessment tools until after intervention.

PEDS questionnaires

Twenty-seven de-identified PEDS forms were returned for further analysis (6 from practice A, 13 from practice B and 8 from practice C). These identified 15 concerns, 6 of which were predictive of at least a moderate risk of disability (8.5 % sample). We were not able to determine the clinical decisions actually made for these children.

Discussion

In Australia, all parents must produce an 'Immunisation History Statement' before their child is enrolled in school [25] and parents receiving income support must also obtain a health check for children turning four years of age [26], thus presenting opportunities for general practice to identify young children at risk and intervene to reduce disparities. Our study confirmed the feasibility of delivering a multi-faceted intervention to increase HKCs in

Table 6 Proportions of eligible children completing HKCs and having BMI recorded

Parameter	Practice	Baseline (percent)	6 months after intervention (percent)	Z score	P value
Population of eligible children as proportion of practice population	A	14.6	9.8	6.13	0.
	B	16.5	16.1	0.77	.44
	C	13.0	13.2	-0.64	.52
Proportion of eligible children completing a HKC	A	6.1	14.7	-4.29	0.
	B	0.8	2.7	-3.9	0.0001
	C	-	-	-	-
Proportion of eligible children with BMI recorded	A	13.0	36.1	-8.06	0.
	B	7.0	10.0	-2.8	.005
	C	18.7	16.9	1.63	.10

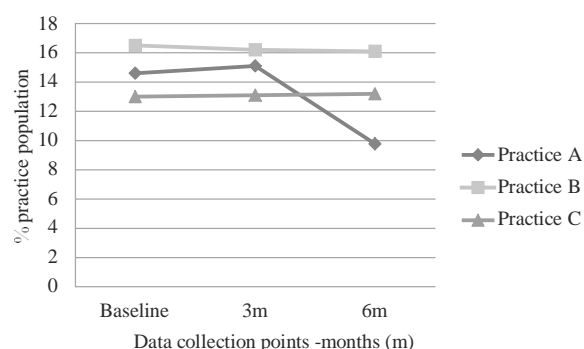


Fig. 2 Population (%) of children eligible for HKC as proportion of practice population

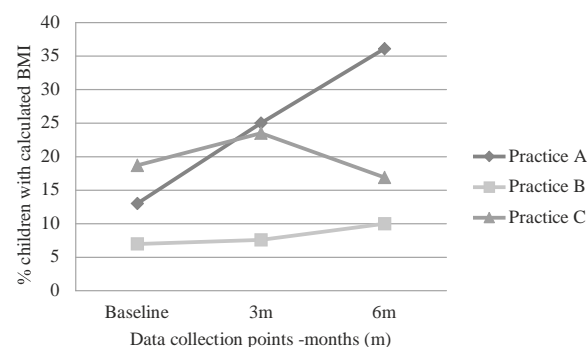


Fig. 4 Proportion (%) of eligible children in each practice with calculated BMI

general practice. In the US multi-faceted preventive child health interventions have been assembled as combinations of single element interventions, often without a clear rationale for their choice [13]. Grimshaw et al. observed that an increase in dose of “component interventions” did not always lead to an increased response and proposed that multi-faceted interventions should be “built upon a careful assessment of barriers and a coherent theoretical base” [27]. In our study the elements that constituted the HKC-intervention were determined using a theoretically based behavioural change system. This pilot study demonstrated that the assembled package of intervention-components successfully incorporated solutions to the barriers identified in our primary research. Findings suggest that by upskilling the practice nurse and by taking a team approach, GPs were able to streamline processes, incorporate evidence-based preventive health care, standardise and improve quality and increase self-efficacy, delivering HKCs. The duration of the study was not long enough to determine if proportions of children completing HKCs in these practices ever attained the state-wide average of approximately 22 % [15]. An aspect of the intervention that worked less well was the training module for clinicians. Despite a flexible approach, the research team noted that

GP-attendance was frequently interrupted by clinical demands so that training was incomplete for approximately half of attendees. ‘E-learning’ provides a flexible training method for clinicians [28] and has been successfully applied to paediatrics [29], presenting a potential solution in future trials of the intervention.

A second problem related to difficulties collecting data. Software changes for practice C, in the year before the study, precluded collection of baseline data. In addition, practice A undertook ‘database cleansing’ during the study, which produced an apparent large decline in total and age-eligible populations. General practices in Australia do not have fixed lists of patients, so that when practices decide to update patient databases they must determine which patients still ‘actively attend’. The commonly accepted definition of an ‘active’ patient, ‘attending three or more times in the past two years’ [30] differed from the less conservative definition employed in this study - ‘any patient attending at least once in the last 12 months’. This definition was decided upon as families access healthcare on behalf of their children from a variety of sources, and may not attend one practice on three occasions over 2 years. This may partially explain the extremely low proportions of

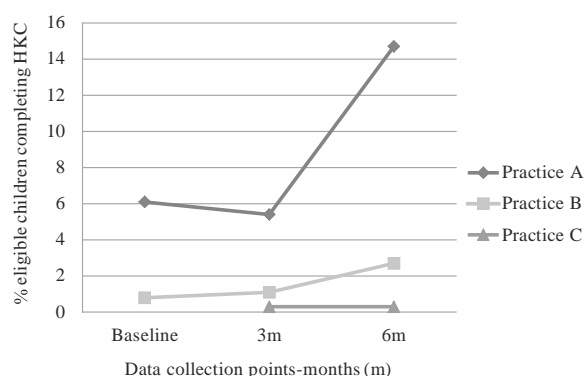


Fig. 3 Proportion (%) of eligible children completing a HKC

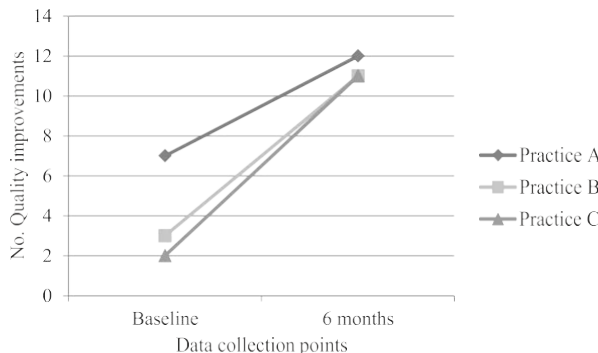


Fig. 5 Quality Improvements in practice A, B and C following HKC intervention

children we recorded completing HKCs. In practice A, changes in the way patients were recorded over the course of the study may have artificially inflated the proportions of children documenting BMI and HKC improvements, although analysis at 3 months already showed improved HKC counts.

This study did not determine children's health outcomes, or the referrals made as a result of HKCs, an additional barrier that influenced practitioner motivation in our previous research. A record was made of how many times practitioners thought they had accessed resources to address the outcomes of HKCs, however. Both 'Parent tip sheets' and 'Referral pathways' were accessed, suggesting that a significant proportion of problems were managed in-house. Secondary screens were accessed by a total of five GPs but only one PN. This implies that within the HKC process there is a degree of role separation. GPs are more likely to assume responsibility for decision making when problems are identified within a HKC, a practice reinforced in our business model, PEDS interpretation and training.

This pilot project demonstrated significant changes in measures of HKC uptake and BMI. However, the before and after study design means that we cannot be certain that our intervention was the sole reason for the observed differences. Anecdotally, staff informed the project nurse that a software upgrade, installed midway through the project in all practices, automated and correctly categorised BMI for children undergoing same day readings of height and weight. This automated measure would have enabled PNs to interpret readings and could account for the improvements in proportions of children having BMI recorded outside of HKCs, during sick-child consultations. Discussions with HKC-Champions revealed that they were not calculating or interpreting BMI prior to the intervention, but did not elucidate whether other clinicians were doing so. Practitioners' relative ambivalence towards measuring BMI for young children, which following intervention remained unchanged for some GPs, also suggests further education may be needed.

Results show that relatively large quality improvements were made across three different practice areas: office systems, equipment and examination techniques. The practice that started from the lowest base made the largest gains (practice C), but all practices improved across each domain.

Limitations

This intervention study employed a 3 month active intervention period with an additional 3 months of follow-up. It is not known if practices continued to deliver HKCs using this format following the study. It would be interesting to know, for example, if practices

continued to acquire PEDS questionnaires or if systems can be maintained during staff turn-over. This study recorded equipment and processes but did not assess how effectively PNs conducted HKC-examinations. From the PEDS forms that were returned, it was estimated that a small proportion of children had concerns predictive for developmental delay. There was no way to determine if these problems were acted upon by the medical team or the parents. Future studies could be designed to address such issues.

This study was conducted in an area that serves large numbers of young families with pockets of high socioeconomic disadvantage and child developmental vulnerability [15]. It would, therefore, be important to test this intervention across diverse populations, allow longer follow-up periods and include control sites to avoid bias, before recommending full uptake.

Negative effects

It is possible that by concentrating on one area of preventive health care in general practice, another sector lost out. PNs' responses noted diminished participation, or reduced confidence, in other aspects of preventive health. This appears to be a valid observation because it is unlikely that participants would recall their responses to pre-intervention questionnaires. In the US, different preventive services have been found to compete with each other for physicians' time, as well as with acute care [31] and caution has already been expressed about the opportunity costs of preventive services in Australian general practice [32].

Lessons learned and steps towards a cluster randomised controlled trial

A cluster randomised (phase III) trial would provide further evidence of the effect size of the intervention and would test generalisability to other populations. Recruitment methods (through PHOs) will be extended to practice-based research networks already affiliated with the research team. It would be important to test the intervention in another Australian jurisdiction because Victoria's CFN services operate differently to other states and may impact on GP service delivery, with a control arm to increase the strength of the study (usual care, including HKCs conducted without the practice based intervention).

This pilot study demonstrated that the intervention was acceptable and feasible, and confirmed the selection of outcome measures (an increase in the proportion of eligible children receiving HKCs and having BMI recorded, and significant quality improvements to practice processes and equipment). Data collection methods will extend over 12 months and the commonly accepted term for "active" patients will be adopted to maintain

consistency within the data [30]. Paper-based surveys of practitioners will test GP and PN self-reported knowledge and self-efficacy (adapted from another preventive health study [33]) and health care utilisation following HKC will be captured (from government Medicare insurance services) to obtain important data regarding health outcomes. Arising from the pilot study was a recommendation to develop a web based module to streamline delivery of components of the training.

Conclusions

Healthy Kids Checks have the potential to identify disabilities, health and behavioural concerns at a significant juncture for children and their families. This pilot study provides the first indications that it is possible to increase preventive healthcare for young children by increasing numbers of HKCs. A cluster randomised controlled trial would provide more definitive evidence for a multifaceted intervention, particularly if study sites were located across different states, and included a mix of practices. It would need to incorporate an evaluation of other aspects of preventive health, given that possible negative effects were detected in this study and it could be improved by incorporating research into the clinical outcomes of HKCs.

Abbreviations

BMI: Body mass index; CFHN: Child and family health nurses; GP: General practitioner; HKC: Healthy Kids Check; PCS CAT: Pen Computer System Clinical Audit Tool; PEDS: Parents' Evaluation of Developmental Status; PHO: Primary healthcare organisation; PN: Practice nurse; US: United States.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

DM conceived and co-supervised the study with BB. KA conducted the study, undertook data analysis and wrote the first draft of the manuscript. DM and BB read, critically reviewed and approved the final manuscript.

Acknowledgements

The authors gratefully acknowledge support received from Dr Lyle Turner (statistician), and the staff of the primary care organisation, particularly Ms Anne Noonan, project nurse, and the practice managers, general practitioners and practice nurses who took part. This research was funded by a Chris Silagy Scholarship from the Royal Australian College of General Practitioners. The funding body had no role in the study, writing or submission of the manuscript. BB is supported by a fellowship from the National Health and Medical Research Council of Australia.

Received: 22 June 2015 Accepted: 9 July 2015

Published online: 05 August 2015

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Lessons learned

Recruitment

Recruitment began in November 2013 the year before the project, via an electronic newsletter to 158 general practices sent from the primary health organisation. This generated only one expression of interest. A further five practices were contacted directly by the project officer because PNs at these practices had expressed a desire for training to deliver the HKC. This gave a total of six expressions of interest. One practice was excluded because it was an Aboriginal Health Centre (provided Aboriginal child health checks not HKCs); a second practice decided against participating after an initial expression of interest and a third suffered staff disruption and withdrew. Three practices enrolled and completed the project. These figures demonstrate the difficulties researchers face recruiting into GP-research projects and the importance of local research networks (that should be adequately funded) (Yallop et al., 2006). Retaining practices in research may require additional funds as practices weigh up the real costs of undertaking research projects (Dormandy et al., 2008).

Fidelity

Fidelity to the design of the intervention was recorded using a 'running sheet' to keep track of each stage of delivery of the intervention (e.g. training, data extraction). The project nurse was asked to complete the running sheet three months and six months after delivery of the intervention to each practice, to ensure the intervention was delivered as intended. Measures of fidelity, however, were restricted to recruitment rates (detailed above) –1.9 per cent of practices, training participation rates of 91 per cent of participants (but only 50 per cent of participating GPs) and questionnaire completion rates (measure of responsiveness) of 77 per cent among participants. Adherence to a protocol that requires precise delivery of Behaviour Change Techniques is important in implementation research and has been successfully measured (79 per cent adherence) in one work-shopped intervention study (French et al., 2015). Audio-recording and analysis of transcripts for Behaviour Change Technique-content delivery could be similarly applied in future studies.

Data collection

I encountered a number of difficulties collecting data and administering the intent of the pilot project, some of which are detailed in the published article (measuring the practice population and BMI). Additional difficulties are detailed below.

Numbers of HKCs

Originally I had envisaged that numbers of HKCs could be captured through remote access ‘snapshots’ using PenCAT data collected by the Medicare Local on behalf of the practice. However, because these measures had taken place at varying time-points over the preceding year, and I required the same time-period for each practice, I was unable to use this data snapshot. I therefore attempted to capture the numbers of HKCs, and the proportion of children completing HKCs, from each practice *on site* at baseline, three and six months following intervention. Several methods were proposed that tried to circumvent the difficulties and alternative technologies may have been able to do this, but we were impeded by time and resource limitations.

1. The Medicare ‘Health Assessment’ item numbers (see Table 2) in the age group of interest (3-5 years) could serve as a proxy measure of the number of HKCs performed in each practice. I found it was only possible for the PenCAT tool to record the numbers of Health Assessments when the billing software matched the clinical software and usually this was not the case.

2. Records of preschool immunisations could be scrutinised because this service must be completed for a child to be eligible for a HKC, and often they are conducted on the same visit. The project nurse conducted an electronic search of all children who had received pre-school booster vaccinations and then turned to the progress notes (clinical record of visits) to see if there was a record of a HKC having taken place. No identifying data was recorded during this process. This method proved unsuccessful because, in this region, many children were attending for catch-up vaccinations (high number of refugees) and, due to age-range restrictions, were ineligible for HKCs. In addition, there were reports from the HKC-Champions that some children declined a HKC at their pre-school vaccination appointment because they had already obtained a health check with the MCHN.

3. HKC-Champions were requested to record all HKCs in “Reason-for-encounter (RFE)” headings in the progress notes, so that future counts could utilise a search function within ‘RFE’ to record the number of HKCs completed. This only obtained HKCs recorded in this way from that time-point onwards.

Consequently, in one practice (Practice C) I was not able to obtain a baseline recording of the number of HKCs. This may have led to measurement error and an under- or over-estimate of the effect of the intervention. It is likely that future studies would also require a number of strategies to capture baseline data, and would need to be adequately resourced to do this.

Practitioner questionnaires

Collecting completed questionnaires from clinicians also proved more arduous than anticipated. Practitioners often excused themselves from completing data at the time the intervention was delivered, citing clinical commitments and assuring they would ‘fill it in later’. However, this rarely happened. As a result, some baseline data was missed. The HKC self-evaluation forms were not completed by any HKC-Champion which suggested that completing them at the time of the HKC was too onerous (and therefore would not be recommended in future studies). The fact that GPs only partially completed training due to clinical commitments led to the recommendation that, in future studies, web-based training for clinicians that could be completed outside of working hours, would be provided.

It is important to capture any unintended negative consequences resulting from an intervention study. I incorporated a validated job satisfaction questionnaire (Warr et al., 1979) into practitioner questionnaires because our intervention encouraged staff to adopt new ways of working. Results showed that job satisfaction scores remained consistent, except for one HKC-Champion who recorded reduced job satisfaction scores following the intervention. This was investigated by the project nurse and was found to be unrelated to the project, but underscores how important it is to collect this data.

Other questionnaires

The 'Implementation status grid', which was adapted from US forms and aimed to document how well-equipped the practice was to provide child preventive healthcare, was worded in such a way that it may have been misinterpreted. A selection option of 'BI = begun implementing on a pilot basis', meaning the practice was not using the equipment/system regularly but had tried it out, was interpreted as "Implemented at the onset of this pilot study". This did not change the results of the intervention, however.

Communication difficulties

Additional problems encountered by the project nurse that would need to be addressed in a future study were a lack of means of communicating directly with the HKC-Champions (PNs did not have individual work email address or phone numbers). Reception staff changes also meant that sometimes new methods of working were not conveyed and the absence of one practice manager, who was away for a protracted period, exacerbated communication problems and led to delays obtaining results.

Outcomes

Most of the positive comments regarding the study were in relation to the use of the PEDS questionnaires. All practices embraced using them as part of the HKC and both practitioners and staff considered that PEDS training would lead to a change in their current practice.

"The PEDs questionnaire [is] very impressive and I am certain this will help me to do more thorough checks and assessments" (HKC-Champion Practice A)

Despite this, the total number of returned PEDS (27) was considered to be an underestimate of the total number of HKCs performed during the project. It is possible that, despite a request to retain *all* PEDS forms, some may have been disposed of, particularly if they had not identified concerns. All retained PEDS questionnaires were de-identified and their content was analysed: eight out of 27 questionnaires indicated parent concerns, six of which were 'predictive' of possible developmental delays and required further evaluation. Whilst I do not know the actual outcomes of the PEDs

screening-pathways this small sample reflects the frequency of “developmental vulnerability” which, for children in Australia, stands at 22 per cent. In fact, children in the community of Greater Dandenong have an elevated risk of 37 per cent developmental vulnerability.

The duration of the study was one of its limitations. It also meant for children identified during the HKC as having developmental or health problems, I was not able to follow them up. This would be important to ascertain in a future study because ‘lack of knowledge of outcomes’ was identified as a significant barrier to practitioners’ motivation to undertake HKCs in our primary research.

One study has researched the outcomes from HKCs in an audit of two Queensland practices. It found that one fifth (21 per cent) of HKC services detected some sort of health or developmental problem not previously known to the parent or the practitioner (Thomas et al., 2014). It is possible that the opportunity to conduct specific examinations, isolated from ‘sick-child’ consultations, is beneficial to uncovering particular health problems (e.g. vision impairments). The significance of regular contact with general practitioners was underscored by the fact that routine GP-consultations, prior to a HKC, had uncovered 19 per cent of developmental problems. An additional four per cent of problems were detected subsequent to HKC examinations. This research group called for more robust research to determine the long term outcomes of children identified as having health concerns during HKCs. They also wanted to ensure that no harms resulted from ‘screening’ children (over-diagnosis) (Thomas et al., 2014).

I noted in this research that the recorded rates of childhood overweight and dental caries were much lower than would be expected from national surveys (Chrisopoulos et al., 2016; Wake et al., 2007). This could be explained by local population differences (or a particularly healthy population attending these clinics) or that health issues were present but were not identified. In a letter to the Medical Journal of Australia I queried these low prevalence rates. I agreed that a more comprehensive evaluation of HKC-outcomes was called for, that included long-term follow-up of children, and captured the views of parents and clinicians (Alexander, Brijnath, & Mazza, 2015b).

The health of “emerging adults” in Australia: freedom, risk and rites of passage

TO THE EDITOR: I wish to thank Kang for her editorial on the health of “emerging adults”, articulating experience familiar to those who care for young people.¹ The overview should be read in conjunction with Kang’s contributions as a senior co-editor of *Youth health and adolescent medicine*, which I reviewed in the Journal last year.²

The student health services developed in our universities during the past 50 years resemble facilities elsewhere; more than first-aid posts, they teach us to respect and cherish young people who seek help and spur us to find the best ways to work with them. Encounters with students may begin with consultations about everyday problems, but well managed sore throats and sprained ankles can be door openers for more serious questions.

An accepting environment encourages the exploration of personal concerns, many of them related to what Kang recognises as “The widening gap between biological and psychosocial maturation”. Student health workers become aware that young people often need simply to talk to accepting older people, which an appropriate attitude can facilitate.

Kang’s editorial waves a flag for the uniqueness of young people and challenges us to address a critical transitional period with thoughtful research and imagination.

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Competing interests: No relevant disclosures.

doi: 10.5694/mja15.00019 ⁿ

¹ Kang MS-L. The health of “emerging adults” in Australia: freedom, risk and rites of passage [editorial]. *MedJ Aust* 2014; 201: 562-563.

² Williams MG. Youth health comes of age [book review]. *MedJ Aust* 2014; 200: 55. ⁿ

Identified health concerns and changes in management resulting from the Healthy Kids Check in two Queensland practices

TO THE EDITOR: Thomas and colleagues, in their article on identification rates for health and developmental problems of preschoolers before and after Healthy Kids Check (HKC) services,¹ make a valuable contribution to the literature on the outcomes of health assessments.

Their research showed that HKCs were more likely than routine general practitioner visits (in the first 4 years of life) to detect oral health, vision and behavioural problems (prevalence rates among 557 children of 1.8% v 0, 3.8% v 1.4% and 2.3% v 1.8%, respectively), suggesting that HKCs presented an opportunity for families to deal with previously unmet health needs. However, the numbers of height and weight problems and oral health problems reported in this study were surprisingly small. National prevalence rates of more than 20% for childhood overweight² and 40% for untreated dental caries³ were not matched in this study, where the rates for height and weight problems and oral health problems were only 3.2% and 1.8%, respectively.

It is possible that the communities involved experienced exceptional health status (the socioeconomic status of clinic populations was not described) or that only healthy children attended HKCs — or it is perhaps more likely that these problems remained undetected. Such discrepancies in the rates are significant because HKCs were established, in part, to detect early lifestyle risk factors; an aim that cannot be realised if there

“ well managed sore throats and sprained ankles can be door openers for more serious questions

”

Williams

“ a more comprehensive evaluation of HKC outcomes ... is needed to determine the true impact

”

Alexander et al

is incomplete recording of these developmental indicators.

The findings of Thomas and colleagues suggest that HKCs are partially improving the early detection of lifestyle risk factors. However, a more comprehensive evaluation of HKC outcomes — incorporating the views of clinicians and parents with long-term follow-up of children across various health settings — is needed to determine the true impact.

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Competing interests: No relevant disclosures.

doi: 10.5694/mja14.01557 ⁿ

- 1 Thomas R, Doust JA, Vasan K, et al. Identified health concerns and changes in management resulting from the Healthy Kids Check in two Queensland practices. *MedJ Aust* 2014; 201: 404-408.
- 2 Wake M, Hardy P, Canterford L, et al. Overweight, obesity and girth of Australian preschoolers: prevalence and socio-economic correlates. *IntJ Obesity* 2007; 31: 1044-1051.
- 3 Chrisopoulos S, Harford J. Oral health and dental care in Australia: key facts and figures 2012. Canberra: Australian Institute of Health and Welfare, 2013. (AIHW Cat. No. DEN 224.) ⁿ

IN REPLY: We thank Alexander and colleagues for their interest in our article. They query the low rate of detection of oral health problems and overweight and obesity. We are surprised that they question our failure to detect oral health problems, given that their analysis found this screening to be ineffective.¹ Perhaps the general practitioners in our study did not embark on ineffective screening.

Our data show that the overall detection was 5% for problems related to height and weight. This might correspond to the 6%-7% of children aged 5-9 years with obesity² (for whom action may be effective), rather than to the additional 15% with overweight.

More importantly, by viewing the prevalence of health problems in children as a general practitioner compliance and measurement concern, we lose sight of the bigger picture. Does the Healthy Kids Check detect problems that lead to better child outcomes? We do not know. This is a health policy that has been implemented without adherence to evidence-based practice principles. We agree – long-term follow-up is essential.

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doi: 10.5694/mja14.01606 n

- 1 Alexander KE, Mazza D. The Healthy Kids Check – is it evidence-based? *Med J Aust* 2010; 192: 207-210.
- 2 Australian Institute of Health and Welfare. Who is overweight? <http://www.aihw.gov.au/who-is-overweight> (accessed Nov 2014). n

The importance of molecular testing to confirm measles, mumps and rubella in vaccinated individuals

TO THE EDITOR: Despite high vaccination coverage, Australians remain at risk of measles, mumps and rubella, either while travelling to endemic countries or from domestic exposure to imported cases. Those most at risk include incompletely vaccinated adults and children whose parents choose not to have them vaccinated. Additionally, immunity generated by vaccination (rather than natural infection) may be less protective, especially if only one vaccine dose is received.^{1,2}

When measles, mumps and rubella were commonly encountered, their clinical features were well recognised, but far fewer cases are now seen, diminishing clinical acumen and the positive predictive value of a clinical diagnosis. Further, the relative proportion

of cases in previously vaccinated individuals has increased, making the clinical diagnosis more difficult as these cases may present atypically.^{1,3}

With this clinical uncertainty, laboratory confirmation assumes greater importance.⁴ However, the IgM response can take several days to appear and can be attenuated or completely absent in post-vaccination infection,^{1,2} necessitating molecular detection methods to confirm the diagnosis.^{2,4} Polymerase chain reaction (PCR) testing has been shown to contribute significantly to laboratory confirmation of measles^{2,5} and mumps^{3,4} in highly vaccinated populations.

We investigated the vaccination status and mode of laboratory confirmation of notified cases of measles, mumps and rubella in Western Australia over almost 10 years, from January 2001 to September 2010. During this period, 82 cases of measles, 335 of mumps and 38 of rubella were notified to the Department of Health. Of these, eight patients (10%) with measles, 117 (35%) with mumps and four (11%) with rubella were fully vaccinated; 16 (20%), 39 (12%) and five (13%), respectively, were partially vaccinated; and 46 (56%), 53 (16%) and 22 (58%), respectively, were

“ Polymerase chain reaction (PCR) testing has been shown to contribute significantly to laboratory confirmation of measles and mumps in highly vaccinated populations ”
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unvaccinated. Thirty-two per cent of measles, 49% of mumps and 89% of rubella cases were confirmed by IgM serological testing alone; 34%, 2% and 3%, respectively, were confirmed by serological testing and PCR; and 20%, 38% and 3%, respectively, were confirmed by PCR alone (IgM not detected or not requested). A further 15% of measles, 10% of mumps and 5% of rubella cases were diagnosed using clinical and epidemiological criteria, without testing. Overall, when laboratory-confirmed cases were stratified by vaccination status, the proportion confirmed by PCR alone increased from 18% in the unvaccinated to 71% in the fully vaccinated, including from 21% to 63% for measles, and 22% to 74% for mumps, respectively (Box).

These data confirm the increased number of measles and mumps cases diagnosed by PCR rather than serological testing among people who are fully vaccinated compared with the unvaccinated group. Diagnosis by PCR allows virus genotyping, which is important for epidemiological purposes² and can distinguish wild-type measles virus from the vaccine strain when vaccine is used for post-exposure prophylaxis.⁵ We recommend collection of respiratory specimens, whole blood and/or urine for PCR

Laboratory-confirmed cases of measles, mumps and rubella in Western Australia, January 2001 to September 2010					
Vaccination status	Laboratory confirmation	Measles (n=70)	Mumps (n=300)	Rubella (n=36)	Total (%)
Fully vaccinated	Serological	3	26	3	32 (28%)
	PCR	5	75	0	80 (71%)
	Both	0	1	0	1 (1%)
Partially vaccinated	Serological	5	17	4	26 (46%)
	PCR	3	15	0	18 (32%)
	Both	8	3	1	12 (21%)
Not vaccinated	Serological	13	39	20	72 (69%)
	PCR	7	11	1	19 (18%)
	Both	14	1	0	15 (14%)
Unknown	Serological	5	82	7	94 (90%)
	PCR	1	27	0	28 (24%)
	Both	6	3	0	9 (8%)
PCR = polymerase chain reaction. u					

Upscaling the pilot study

I aimed to extend the research model established in this pilot study, to test the intervention in other jurisdictions in a cluster randomised trial. It would be important to examine the intervention outside of Victoria, where CFHN and vaccination-services (that intersect with GP services) operate quite differently. Evidence that this is the case comes from the different rates of HKC-delivery (Victoria 22 per cent, Queensland 65 per cent) (Department of Human Services, 2015) and variation in rates of vaccination in general practice (more vaccinations in Queensland general practice than general practices in Victoria) (Department of Health, 2017a). As already discussed, other researchers have delivered a larger, regional, training intervention to encourage delivery of the HKC with brief advice on diet and exercise (Bell et al., 2014). This study was one component of an area child-obesity prevention programme that included approximately 300 general practices in a large sector of NSW. GPs and PNs were provided training over a two year period with an emphasis on accurate measurements, interpretation of BMI and management of healthy weight. Although HKC uptake was reported as 'low', at 31 per cent it was almost double the rate observed in our study and in NSW as a whole (Bell et al., 2014). The design of the study, that only evaluated post-intervention data (see page 33), meant that causality could not be assigned, however, and no other study has reported a RCT of a broad preventive health intervention with children.

Our pilot study established that it was feasible to deliver a multi-component intervention designed to improve a package of several aspects of child preventive healthcare (growth, health, sensory, social, psychological and physical development). In the US, a number of studies have implemented practice-based interventions to increase the delivery of 'Well Child Care' consultations. 'Well Child Care' services are packages of preventive care, including physical check-ups and immunisations, which have been developed into a set of guidelines by the American Academy of Pediatrics according to a child's age (American Academy of Pediatrics, 2017). These are generally adhered to by government agencies and insurance companies, but important gaps in care remain (Sand et al., 2005). A US study tested a 'bundle of strategies' aimed to facilitate their implementation across paediatric practices interstate (Lannon et al., 2008). Using a learning collaborative model, it obtained significant improvements in office system changes that included reminder systems, community linkages and

structured developmental assessment but did not gather information on health outcomes. This model has been replicated across different sites (Earls & Hay, 2006) and many times since (King et al., 2010). A systematic review of child screening interventions in primary care, found that multifaceted interventions implemented through learning collaboratives, had been more extensively researched than other interventions, were relatively effective across practices, but did not explain the variability between results (Van Cleave et al., 2012). The reasons why these studies were more commonly replicated is explored in the systematic review of preventive healthcare presented in the next chapter, but indications from the literature suggested that upscaling the pilot study in Australia would be desirable and feasible.

A pilot study of an adults' preventive health intervention (Harris et al., 2005) that was similarly up-scaled (Harris et al., 2015) provided a model for how this might operate. In a cluster RCT across four states, 32 practices were randomised to receive a practice-level, multifaceted intervention to increase recording of several chronic vascular risk factors (Harris et al., 2015). The components of the intervention also included education and training, feedback, practice support visits, referral information and practice resources. Results demonstrated small improvements in documentation of several, but not all, of the risk factors (between two and six percent). The authors concluded that to achieve larger improvements would require a greater intervention effort or a tailored approach (Harris et al., 2015). Lessons from this study could be applied to our pilot study, with an initial Phase II trial (Figure 3, page 35) planned to optimise the intervention, test efficacy and reproducibility across different jurisdictions and confirm the outcome measures, progressing to a full cluster randomised controlled Phase III trial:

- Attention to measures of self-efficacy. Provider confidence appeared to be correlated to how often risk factors were recorded in the medical record. Self-efficacy, measured in clinicians' questionnaires, linked to outcome measures according to individual practitioners (not clusters), would need to be measured in a separate study that focuses on the outcomes of the intervention.
- Measurement methods that capture the different ways GPs record data. This is highly relevant to our study because the terminology of 'overweight' and child-developmental

problems is so broad, and weight, height and BMI would not necessarily be captured in the free-text notes of the clinical record. A specific study could explore this to improve measurement of the effect of an intervention.

- Additional efforts to reduce inter-practice variation in documentation. The fidelity of a study should record measures of: content (what was delivered); intensity (e.g. over how many practice visits); and duration (e.g. over what time period the intervention was delivered). However, inter-practice variation may come down to individual differences in practitioners. This also demonstrates how important it is to recruit a variety of practices, stratify by certain characteristics (e.g. solo, small group, large group practices) and randomise into intervention and control arms of the trial– to make findings more generalizable.
- Despite high levels of baseline risk, the study found no significant changes in proportions of patients identified as at risk. Therefore, specific management plans are required for patients identified as at-risk, with adequate time and resources to capture clinical outcomes and make recommendations. Our primary research identified that outcomes of clinical efforts were essential to practitioners' motivation. More importantly, "the likely benefit of the research must justify any risks of harm or discomfort to participants" (National Health and Medical Research Council, 2015). Beneficence, as a core principal of research, must encompass the possible outcomes of the surveillance of children and the real risk of uncovering problems if resources for follow-up and treatment pathways are found to be inadequate.
- The study recorded noticeable baseline differences between intervention and control sites when practitioner-years in general practice were measured. Cluster trials require larger sample sizes to account for group effects and allocation techniques can be employed to balance out baseline measures (Ivers et al., 2012).

Following removal of the financial incentives for practitioners completing HKCs, the intervention was adjusted so that it could be streamlined into routine general practice appointments. This is discussed below.

Change in context – Removal of Healthy Kids Check, and its implications

The importance of the broader context was driven home when, in November 2015, funding for the HKC was withdrawn so that PNs were no longer supported by Medicare to provide HKCs (Alexander & Mazza, 2015). This removed the financial drivers behind the provision of HKCs and the basis of the business model I had presented to practice managers. (This did not apply to adult or aged-care health assessments). More importantly, it signalled a withdrawal of previous government commitments to future generations of Australians and stalled the momentum gained by the implementation of knowledge gained from two decades of neuroscience in child development (Council of Australian Governments, 2009). The ‘belt-tightening’ assigned to fiscal responsibility failed to take the long term view required to reap the benefits of preventive health policies.

The role of ‘context’ extends beyond merely the “physical environment or setting in which the proposed change is to be implemented” (Nilsen, 2015 cites Kitson, 1998). As a “higher order analytic unit”, it has great capacity to mediate changes to both the implementation process and outcomes (Nilsen, 2015). If context alters, it is likely that the behavior, itself, will change. Our primary data had indicated the significance of the business case: financial drivers were one reason, cited by practitioners, to provide HKCs. A quote from a PN-participant in the focus group from the higher socio-economic Bayside area of Melbourne highlighted the precarious nature of general practice as a ‘small-business’ in Australia:

“I don’t feel our practice is very commercially viable. And every day I feel that the practice is a day by day prospect as to whether it is even going to remain open. So I am always looking to try and keep, you know, if I can be participating to bring some financial stuff into the clinic then I will try and do that and assist where I can, because I like working there. And I don’t want to see the clinic close, but I do fear for the clinic.”
(PN2 Bayside)

The withdrawal of the Medicare benefit assigned to HKCs effectively meant that GPs would have to provide *all* of the HKC-components for a Medicare benefit to apply, and, even then, this would be reimbursed at standard consultation (reduced) rates. GPs had told us they were unwilling to administer this preventive health check without PN-support, therefore it is likely that preschool health assessments would be withdrawn from most general practices.

The withdrawal of funding for a single health assessment in preschool children, in the age of ‘Evidence Based Medicine’, may reflect the lack (or paucity) of evidence that the HKC had made any impact on the health of a child (absence of evidence rather than evidence of absence). Duplication of services already provided by CFHNs was another reason cited by government (Russell, 2015). Child and Family Health Services had established a clear agenda that incorporated health assessments of preschool children, and further developing expertise in child developmental assessment (National Child Health and Wellbeing subcommittee of the Australian Population Health Development Principal Committee, 2011). What remains unknown, however, is whether the parents of young children who obtained health assessments from the CFHNs were the parents who declined GP-led HKCs. It seems probable that some children missed out altogether. Before HKCs became available, Victorian data showed that MCHN preschool health checks were obtained for approximately 60 per cent of children (Moore & Grove, 2008). This rate is regarded as much higher than in other states and territories (Schmied et al., 2015). To reach these children, access to health assessments from a variety of providers needs to be increased (not decreased) and possibly incentivised to seek out children who have missed CFHN assessments, similar to the immunisation catch-up scheme (Department of Health, 2017b).

Another factor that may have contributed to the withdrawal of the HKC was the lack of explicit or authoritative *support* for the HKC from professional organisations such as the RACGP. The RACGP, following removal of the HKC, revised its latest update of the “Red Book” section on ‘Preventive activities in children and young people’ (Royal Australian College of General Practitioners, 2016a). There are no specific recommendations to use structured developmental surveillance but practitioners

are now advised to incorporate developmental assessments into consultations (PEDS is suggested). In the US, where medical practitioners are responsible for children's medical needs as well as preventive services, despite endorsement from professional bodies and guidelines that have been in place for more than a decade, many practitioners still fail to deliver systemised high quality 'Well Child Care'. This highlights the scale of the problem and the importance of interventions that address the socio-political environment (grey, outer wheel of the BCW) as well as individual behaviours and local context (red, inner wheel).

Child and Family Health Nurses have therefore assumed governance of 'Child health surveillance' and general practice will resume a passive, opportunistic role in child development/health prevention and promotion. This therefore risks overlooking a vulnerable sector of the Australian population.

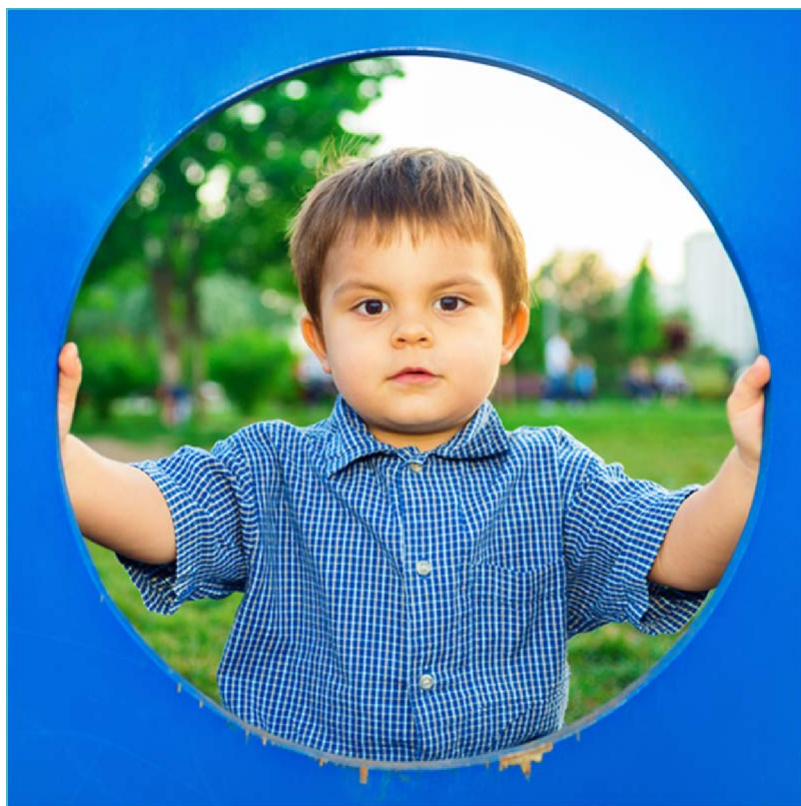
Scrapping the Healthy Kids Check: a lost opportunity

Maintaining child preventive health and developmental assessments will challenge general practice from 1 November

In May, the federal government announced in the 2015e16 Budget that the Healthy Kids Check (HKC) Medicare items will be discontinued from 1 November 2015,¹ citing underperformance, cost blowouts and duplication of state and territory programs.

The HKC was introduced into general practice in 2008, policy that reflected advances in neuroscience (eg, the evolution of brain architecture, critical time points for development and the benefits of early intervention) and significant health shifts towards prevention. Uptake of the health assessment was slow (16% of eligible children in its first year²) and beset by argument about a lack of evidence for some of its mandatory components³ and by scaremongering about labelling 3-year-olds with mental health diagnoses.⁴ In the ensuing negative debate, it was easy to forget major barriers to preventive health care before the HKC: sick child consultations, poor remuneration, lack of time, resources and training,⁵ and the ever-increasing demands of chronic disease management in an ageing population. Nevertheless, over the next 7 years, uptake of the HKC climbed to 50%,² as practice nurses were upskilled and parents were incentivised by tax benefits.⁶ Our research with practitioners, 3 years after its introduction, indicated that in some circumstances, the HKC had acted as a catalyst for general practitioner and practice nurse (PN) role development, and in some cases promoted an entire practice shift towards preventive health care for young children.⁷ The important contribution made by PNs, in particular, has been overlooked by the government in its statement that GPs can continue to provide health assessments as part of Medicare-funded general GP attendance items,⁸ because PNs are excluded from those services.

The government also contends that no evidence had been provided to show that HKCs deliver superior benefits to children. The findings of an evaluation of the "expanded HKC", which underwent trialled in eight Medicare Locals in 2013, have not been made public, but one published study considered the outcomes from HKCs and found that a fifth of HKCs uncovered some sort of health or developmental problem, and between 3% and 11% of HKCs changed the health management of the children concerned.⁹ Despite lower than expected prevalence estimates for some childhood conditions reported in this study (eg, overweight and oral health problems), the findings



still showed that significant numbers of children could benefit from an HKC.

Duplication of state-funded child and family health nurse (CFHN) services was put forward as justification for the removal of HKCs. However, CFHN service delivery varies widely between the states. Even in Victoria, where comprehensive services are provided, only two-thirds of families attend the 3.5 year health assessment.¹⁰ Our research with parents revealed that although some parents were willing to visit CFHNs with their infants, not all parents presented with their toddlers.¹¹ For a variety of reasons, parents "get busy", so that attendance rates drop off after the first year of a child's life and with successive children.¹¹ We do not know if CFHN non-attendees are the families receiving HKCs from the GP, but GPs are used to working with families and young children. Within this setting of established relationships, some parents choose to have their children vaccinated by their

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doi: 10.5694/mja15.00683

GP, rather than attend local council services or CFHN clinics. Providing parents with a choice of immunisation providers improves access and thus contributes to overall high coverage of child immunisation coverage.

Without a similar comprehensive approach to child developmental assessment, children will miss opportunities for early intervention. In 2012, for example, the average age of children being diagnosed with an autism spectrum disorder was 4 years 1 month despite diagnosis being possible in the second year.¹² This suggests that many children are not being diagnosed before school.

The HKC also provides the context to address rates of childhood overweight that already affect more than 20% of preschoolers¹³ and rates of dental caries that affect one in two children aged 5 years.¹⁴ Without protected opportunities to engage parents regarding child preventive health and without the signal that the HKC gives to parents that GPs are interested in such issues, children will continue to miss out on preventive health activities routinely delivered to other sectors of the population.

Podcast with Dr Karyn Alexander available at www.mja.com.au/multimedia/podcasts and from iTunes. Also available as a video at www.mja.com.au/multimedia.

“we are effectively reducing the capacity of general practice to promote the health and development of young children, the most vulnerable in our population”

By scrapping the HKC, not only are we reducing the chances of identifying problems earlier but we are effectively reducing the capacity of general practice to promote the health and development of young children, the most vulnerable in our population, who stand to gain the most over the course of their lifetime. This is a retrograde step for Australia's future.

Acknowledgements: This study was funded by the Shepherd Foundation, Melbourne, Victoria, and by a Chris Silagy Research Scholarship from the Royal Australian College of General Practitioners.

Competing interests: No relevant disclosures.

Provenance: Not commissioned; externally peer reviewed. ⁿ

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Chapter 6. Systematic Review

My qualitative research and pilot study revealed potential causes of a reduced uptake and delivery of HKCs and found practitioner capability and motivation were shaped by environmental opportunities that affected their behaviours and provision of services. Specifically, GPs and PNs were constrained by lack of knowledge, skills and standardisation of procedures, competing priorities, and negative beliefs about the outcomes of HKCs. Enablers centred on office and social support for systems which streamlined processes, divided roles and shared common goals. But was this in line with best-practice? Whilst I intuitively thought it was, it was important to return to the literature to identify components of interventions from other studies that targeted increasing the uptake of preventive health for preschool children in the primary healthcare setting. For while the research to date had focused on a ‘bottom-up’ approach to intervention development, I needed to validate the components of my intervention and the lessons learned through a ‘top down’ evidence synthesis. Consequently, I aimed to gain further insights into how primary care interventions might operate and ensure there were no important omissions, by systematically searching for studies of preventive health interventions with young children, then analysing and presenting them within the components of the framework of the Behaviour Change Wheel.

Aims

A review of the literature was conducted to compare our theoretically derived intervention with interventions delivered by other researchers working to increase or improve an aspect of preventive healthcare for children.

Our aim was to examine effective interventions that targeted professionals working in primary healthcare settings, to explore common features and exclude important omissions. It is recapped below and described in full in the publication (Alexander, Brijnath, Biezen, Hampton, & Mazza, 2017). I proposed to do this by analysing independent studies for: Study quality; Theoretical frameworks; Intervention Functions employed and the primary outcome measures used.



Review Article

Preventive healthcare for young children: A systematic review of interventions in primary care

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article info

Article history:

Received 5 October 2016

Received in revised form 19 February 2017

Accepted 25 February 2017

Available online 6 March 2017

Keywords:

Systematic review

Family practice

Primary health care

Intervention

Child, preschool

Preventive health

Child development

abstract

High rates of preventable health problems amongst children in economically developed countries have prompted governments to seek pathways for early intervention. We systematically reviewed the literature to discover what primary care-targeted interventions increased preventive healthcare (e.g. review child development, growth, vision screening, social-emotional health) for preschool children, excluding vaccinations. MEDLINE, EMBASE, CINAHL, and Cochrane databases were searched for published intervention studies, between years 2000 and 2014, which reflected preventive health activities for preschool children, delivered by health practitioners. Analysis included an assessment of study quality and the primary outcome measures employed. Of the 743 titles retrieved, 29 individual studies were selected, all originating from the United States. Twenty-four studies employed complex, multifaceted interventions and only two were rated high quality. Twelve studies addressed childhood overweight and 11 targeted general health and development. Most interventions reported outcomes that increased rates of screening, recording and recognition of health risks. Only six studies followed up children post-intervention, noting low referral rates by health practitioners and poor follow-through by parents and no study demonstrated clear health benefits for children. Preliminary evidence suggests that multi-component interventions, that combine training of health practitioners and office staff with modification of the physical environment and/or practice support, may be more effective than single component interventions. Quality Improvement interventions have been extensively replicated but their success may have relied on factors beyond the confines of individual or practice-led behaviour. This research reinforces the need for high quality studies of pediatric health assessments with the inclusion of clinical end-points.

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Abbreviations: AAP, American Academy of Pediatrics; BMI, Body mass index; EMR, Electronic medical record; GP, General practitioner; HKC, Healthy Kids Check (health assessment); IV, Intervention; MeSH, Medical subject heading; MI, Motivational interviewing; PHC, Primary health care; QI, Quality Improvement; RCT, Randomised controlled trial; RN, Registered Nurse; SDS, Structured developmental screening; US, United States; WCC, Well child care.

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1. Background

In economically developed countries, like Australia, developmental disabilities, mental health disorders and overweight affect between 10 and 20% of preschool children, (Australian Government, 2013; Boyle et al., 2011; Glascoe, 2000; Hazel et al., 2005; Houtrow et al., 2014; Lawrence et al., 2015; OECD Directorate for Employment Labour and Social Affairs, 2014; Wake et al., 2007) and higher proportions are burdened with chronic diseases and dental caries (Australian Institute of Health and Welfare, 2012; Chrisopoulos, 2013; Organisation for Economic Cooperation and Development and OECD, 2009). These high rates of preventable health problems have prompted governments to seek pathways for early detection and intervention, to optimise developmental trajectories, and give children “the best start in life” (Council of Australian Governments, July, 2009).

In this context, in 2008, the Australian Government introduced a general practitioner (GP)-led health assessment for children aged four years - the Healthy Kids Check (HKC) (Australian Government and Department of Health, 2014). Consisting of physical examinations (e.g. height, weight, vision) and health promotion guidance (Table 1) (Alexander and Mazza, 2010), the HKC was timed to coincide with pre-school vaccinations and incentivised by a parent tax-rebate scheme. However, it suffered a mixed reception from GPs and practice nurses and achieved only a 50% completion rate with eligible children (Medicare Australia, 2014). Our previous research examined the barriers and enablers to the HKC (Alexander et al., 2014) and, using a theoretical framework (Michie et al., 2014), developed a ‘whole of practice’

multi-component intervention that was successfully piloted in three practices (Alexander et al., 2015).

In this systematic review we sought to identify interventions that targeted primary care and aimed to improve preventive healthcare (reflecting the components of the HKC) for children aged 2–5 years, excluding vaccinations. Previous systematic reviews of preventive healthcare interventions for children have concentrated on the effectiveness of clinical approaches and screening tests (Chou et al., 2013; Kemper et al., 1999; Nelson et al., 2006; Regalado and Halfon, 2001; US Preventive Services Task Force, 2010) and only two have investigated interventions directed at primary care practitioners (Jacobson and Gance-Cleveland, 2011; Van Cleave et al., 2012). These reviews have included youth screening and tests not routinely applied to well children in Australia (e.g. Chlamydia, lead poisoning, tuberculosis). Our aim was to examine interventions that targeted health practitioners, office staff, or the primary health care setting itself (applicable to family practice), to identify any important omissions before we up-scaled our pilot study.

2. Methods

2.1. Key questions

The research question (applied “PICO”) we sought to address was: What interventions, applied at the level of the primary care team or environment, increase the delivery of preventive healthcare to preschool children?

2.2. Search strategy

Following PRISMA guidelines (Moher et al., 2009), we established a uniform strategy for searching MEDLINE, EMBASE, CINAHL, and Cochrane databases. We systematically searched terms relevant to the evidence based components of the HKC (Alexander and Mazza, 2010), matching terms against possible medical subject headings (MeSH) or keywords. These key terms were combined with a third term that reflected the type of study e.g. “trial” (Supplementary File 1). We limited studies to English language, “all child”, and years 2000 (when developmental screening tools were used in primary care) (Glascoe, 2000) to 2014.

Table 1
Examinations and components of the Healthy Kids Check.

Mandatory	Non-mandatory
Height	Discuss eating habits
Weight	Discuss physical activity
Eyesight	Speech and language development
Hearing	Fine motor skills
Oral health	Gross motor skills
Question toilet habits ^a	Behaviour and mood
Note allergies	Other examinations considered necessary by practitioner

^a There is no evidence for assessing toileting in the preschool age group so this was excluded from the search (Alexander and Mazza, 2010).

2.3. Eligibility criteria

Studies were included if they described an intervention that reported a positive effect (on study personnel or patient population) and included children aged ≥ 2 years but ≤ 6 years (preschool age). Studies were excluded if they were: descriptive in nature (Earls and Hay, 2006; Hunter and Lynch, 2014; Lowenstein et al., 2013; Morinis et al., 2012; Regalado and Halfon, 2001; Webb, 2011), interventions directed at parents (Hunter and Lynch, 2014), professionals in training or dentists, confined to older children and adults (Willaing et al., 2004), or populations of children already identified as ‘at risk’ (Kwapiszewski and Lee Wallace, 2011; Langberg et al., 2009; O’Connor et al., 2013). Studies that analysed treatment effectiveness (Needlman and Silverstein, 2004; Needlman et al., 2005; Nelson et al., 2006) and the psychometric properties of screening tests (Sohn et al., 2004; Webb, 2011) and duplicate studies (Hench et al., 2005) were removed. Two reviewers independently screened each retrieved abstract using the above eligibility criteria and achieved consensus by discussion. A third reviewer was available to resolve any differences. The full text article was obtained where any uncertainty remained (Wessel et al., 2005). The full texts of all eligible studies were retained and exclusions were categorised according to PICO (Fig. 1) (Gance-Cleveland et al., 2009; Maher et al., 2012; Margolis et al., 2001; Sankilampi et al., 2013; Silverstein et al., 2004; Sohn et al., 2004).

2.4. Quality assessment

Three reviewers worked in pairs [KA (Reviewer 1), KH (Reviewer 2), RB (Reviewer 3)] to independently assess the methodological quality of each full text article. Original studies contained within systematic reviews were retrieved and similarly analysed. The Quality Assessment Tool for Quantitative Studies (National Collaborating Centre for Methods and Tools, 2008) was used to rate each study as “strong”, “moderate” or “weak” according to: selection bias; study design; confounders; blinding; data collection methods; withdrawals and drop-outs. An algorithm designed for intervention studies was used to classify study design (Hartling et al., 2011). Consensus between reviewers was reached following discussion. Inter-rater agreement was 91% between Reviewers 1 and 2, and 100% between Reviewers 1 and 3.

2.5. Reporting the intervention

All studies retained for further analysis were then grouped according to prevention-topic and tabulated according to “PICO” (Table 2). Given the diversity of preventive activities, studies were analysed for common theoretical constructs and primary outcomes measures were examined according to a logic model developed by Mold (2014). This model, developed from a systematic review of primary care outcomes, demonstrates how the underlying “Attributes” of good primary care connect

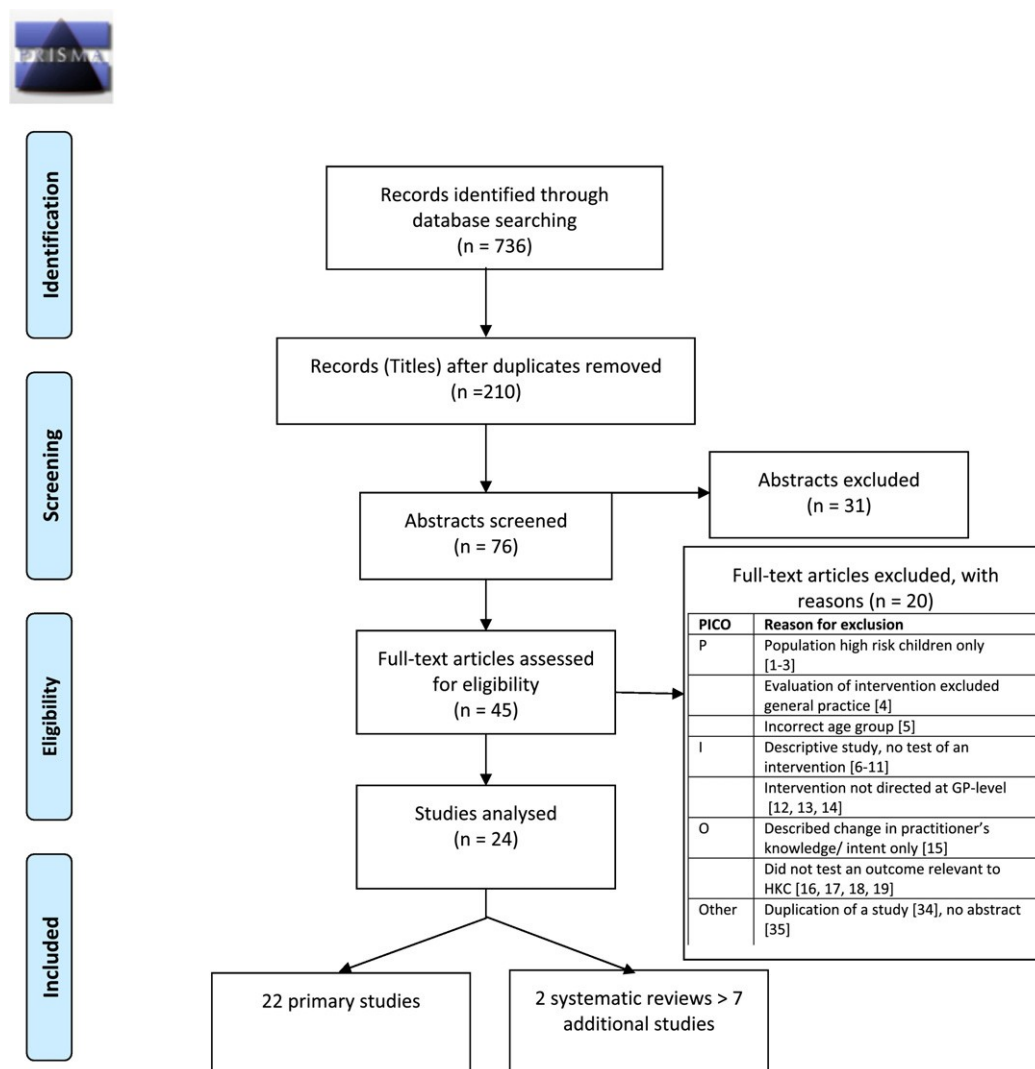


Fig. 1. PRISMA Flow Diagram of results from search: Systematic Review of Preventive Healthcare for Young Children.

Table 2
Studies selected for Systematic Review of Preventive Healthcare for Young Children.

First author	Title	Year	Topic	Aims	Patient population	Intervention	Control	Primary outcome measure (POM)	Time	Setting and participants	Outcomes (indicated in study as statistically significant*) and commentary
Adams	Use of an electronic medical record improves the quality of urban pediatric primary care.	2003	General	Evaluate documentation and delivery of pediatric primary and preventive care	Minority/low income	Introduce electronic medical record (EMR) 986 computer-based visits	Baseline-235 paper-based visits	Quality of documentation of set of primary care measures	9 m	1 urban pediatric practice 7/10 health practitioners	EMR N documentation of items on health*, development*, preventive health* but not immunisation status. Duration of visit, mean N 9.3 min
Allen	Enhancing developmentally oriented primary care: an Illinois initiative to increase developmental screening in medical homes	2010	General/social-emotional	Increase use of validated tools for SDS	Minority/low income	QI	Baseline	Rates of use of validated tools (ASQ and ASQ:SE) for screening (target 85% of visits at 12, 18, 24 m)	2 y	Health practitioners and staff at clinics 16/164 sites 360/2873 responded	Npractitioner confidence and intent to screen. Approx 70% practices reached target at 12 m and 24 m visits, 50% at 18 m visit
Hull	EPSDT preventive services in a low-income pediatric population: impact of a nursing protocol.	2008	General	Reduce omissions (process variability) in preventive service delivery	Minority/low income	Nurse protocol 514 children	Usual care 115 children	Proportion of EPSDT-service "needs" met by service delivery	9 m	1 site 1 RN	99.5% preventive service needs completed by RN* compared to 21.2% in control group (retrospective audit)
King	Implementing developmental screening and referrals: lessons learned from a national project	2010	Development	Implementation of developmental screening recommendations	Diverse - 15 states	QI 44/51 plus 6 additional respondents	51 respondents at baseline	Rates of SDS, rates of failed screens and referral rates. Aim to screen N 85% children at recommended screening ages	9 m	Purposive sample 17 sites 51 participants 3-member practice teams	100% practices screened N 85% children at recommended ages. 14% children failed screening, but only 61% of these referred
Lannon	The bright futures training intervention project: implementing systems to support preventive and developmental services in practice	2008	General	Improve office systems for preventive and developmental services for children ≤ 5 y	Diverse - 9 states	QI	Baseline	Changes in practice use of 6 office systems	9 m	Convenience sample 15/16 sites practice teams	13 practices increased use of office systems* including SDS. Practice barriers noted
Margolis	Assisting primary care practices in using office systems to promote early childhood development.	2008	Development/behaviour	Help practices implement systems to promote child development services	Diverse - Vermont and N. Carolina	QI 18/21 IV sites	17 control sites	Parent recall scores of "high quality care." Practice goals - secondary outcome measures	12 m	35/53 Vermont and N. Carolina pediatric and family practices	IV N proportion (40–52%) of parents' reporting at least 3 of 4 areas of care. Noffice systems (Nmean from 12.9 to 19.4)* and % documentation of SE (22–29)*and SDS (78–88)*

Table 2 (continued)

First author	Title	Year	Topic	Aims	Patient population	Intervention	Control	Primary outcome measure (POM)	Time	Setting and participants	Outcomes (indicated in study as statistically significant*) and commentary
Minkovitz	A practice-based intervention to enhance quality of care in the first 3 years of life the - healthy steps for young children program.	2003	Development/behaviour	Improve delivery of developmental and behavioural services	Diverse populations across 14 states	Complex multi-component family IV 15 sites- 3737/5565 families	6/15 sites (within practice randomisation) 9/15 quasi-experimental sites	4 quality of care outcomes: receipt of services, parent satisfaction, timeliness of visits and parent outcomes	3 y	Practitioners, office staff and 2 additional childhood specialists per IV site-14 states	Nquality of care - timeliness of vaccinations and WCC visits*. No reductions in emergency department use or hospitalisations. IV-parents, more highly satisfied, less likely to use harsh discipline* N likely to remain at practice
Mold	Implementation of evidence-based preventive services delivery processes in primary care: an Oklahoma Physicians Resource/Research Network (OKPRN) study.	2008	General	Impact of multi-component IV on preventive health processes	Mix of urban, suburban and rural-included adult services	QI (multi-component) 12 sites (total of 38 opportunities to N preventive care)	12 sites - benchmark and feedback alone (23 opportunities to improve)	Total number of evidence-based processes implemented	6 m	24/94 practices in 1 research network	At IV sites, improvements in processes increased.* Baseline differences between IV and control practices (IV more likely rural) and more opportunities for improvement in IV group. High cost
Schonwald	Routine developmental screening implemented in urban primary care settings: more evidence of feasibility and effectiveness.	2009	Development	Test feasibility and effectiveness of introducing PEDS into primary care	Minority/low income	QI plus collocated specialist 278 records post-PEDS	338 records at baseline	Documentation of "new" concerns and referral rates. Qualitative data on implementation experience	12 m	2 sites-30/34 providers	Approx 60% children screened post intervention. N detection* and referral of: behavioural problems in 2 year-olds; developmental concerns in 3 year-olds. Almost twice as many concerns identified amongst children aged 3, using PEDS. Providers found SDS easier than expected.
Shaw	Statewide quality improvement outreach improves preventive services for young children	2006	General	Test the effectiveness of a QI program to N preventive services	State of Vermont	QI 930 patients	Baseline	Preventive service area scores for 2 and 4 year-olds (9 different services)	18 m	31/35 sites fidelity with training 35%	Improvements in 5 preventive service areas for 2 year olds and 1 area for 4 year olds (vision)* analysis of independent effect of goal-setting for practices showed goal setting was essential to making improvement.
Young	Evaluation of a learning collaborative to improve the	2006	General	Test if a learning collaborative can improve preventive	State of Utah-73% practices rural, approx 40% Medicaid	Q 517 patient records s post-IV (aim 40/team)	544 patients records baseline	Preventive service scores for 2 and 4 year olds	6 m	14 sites	For 4 year olds: N dental assessment, car-seat advice, vision screening* and

	delivery of preventive services by pediatric practices.			service delivery							recording BMI. Analysis of independent effect of goal-setting for practices showed inconsistent relationship between goal setting and improvement.
Hartmann	Project universal preschool vision screening: a demonstration project.	2006	Vision	Implementation of vision screening recommendations	Children aged 3 and 4 years attending 4 sites	Pilot project. 1326 in PHC	1545 in community clinics	Proportion of children receiving treatment from specialist		Head-start/community clinics and 28 primary pediatric practices across 4 states	Significant differences between PHC and community sites with low referral rates and very low treatment rates from health practitioners. (% children screened post-IV reported only)
Briggs	Social-emotional screening for infants and toddlers in primary care.	2012	Social-emotional	Measure effect of SE screening ± treatment from co-located psychologist	Urban –80% Hispanic/African American/low income	SDS + co-located psychologist 3169 children screened; 41/170 treated	129 children screened but declined treatment	Proportion of children screened	5 y	1 site 13+ physicians	64% children screened. Almost 1/3 of 3 year olds above risk cut-offs. Only 34% children screened N once. Treated children improved subsequent scores*
Hayutin	Increasing parent/pediatrician communication about children's psychosocial problems.	2009	Social-emotional	Examine impact of PSC and scoring procedures on communication about SE issues	High income	PSC + parent scored PSC (56) vs PSC + staff scored (54) vs	Usual care (62)	Parent-physician "communication scores" -rates of discussion of S-E items, and whether concerns were discussed enough		1 family practice and 1 specialist practice (not well-child care) 12 physicians	PSC encouraged discussion re SE and behaviour* for high scoring PSC group. Parents in self-scored group also reported that items on PSC were discussed enough* children aged 4–16 y
Laraque	Reported physician skills in the management of children's mental health problems following an educational intervention.	2009	Social-emotional	Increase knowledge and skills re. Mental health disorders	Diverse	1 day regional educational IV – 137/215 physicians attend	78/215 physicians not able to attend	5 outcomes scored diagnostic, treatment skills and knowledge re. Mental health	6 m	Physicians in 3 states affected by regional disaster	Adjusted mean scores for diagnosing mental health conditions and knowledge of treatment strategies at 6 m*
Ariza	Promoting growth interpretation and lifestyle counselling in primary care.	2009	Overweight/diet/exercise	Promote growth interpretation, documentation and lifestyle counselling	Diverse urban	QI 204 completed	275/320 parents at baseline	Documentation of growth and parent report on 5 health topics and behaviours	6 m	4/5 sites each 2–6 physicians	Ngrowth interpretation following IV* (32 vs 87%). Parents recall of counselling and healthier behaviours unchanged
Brandt	Clinical quality improvement for identification and management of overweight in pediatric primary care practices.	2013	Overweight/diet/exercise	Improve pediatric care and N needs of overweight	New Mexico	QI Approx 150 records at 4 time-points post baseline	155 records baseline	BMI%, documentation and lifestyle counselling N 90% visits	12 m	Purposive - 5 pediatric practices 16/21 pediatricians	Ndocumentation of BMI percentile* (from 49%–99%) N nutrition/physical activity counselling at 2 sites*
Dunlop	Improving	2007	Overweight/diet/exercise	Determine		Step-wise IV -	466 WCVs baseline	Proportion of	6 m	38/44 health	Ndocumentation of

(continued on next page)

Table 2 (continued)

First author	Title	Year	Topic	Aims	Patient population	Intervention	Control	Primary outcome measure (POM)	Time	Setting and participants	Outcomes (indicated in study as statistically significant*) and commentary
Lipman	providers' assessment and management of childhood overweight: results of an intervention. A multicentre randomised controlled trial of an intervention to improve the accuracy of linear growth measurement.	2004	Linear growth	whether training ± distribution of tools N management of overweight N proportion of accurate height measures	8 US cities	training & tools 538 (3 m) 344 (6 m) WCVs Education/training and accurate measuring equipment	Baseline	visits with documented BMI%, nutrition & activity assessment and counselling Increase accuracy to within 0.5 cm of measures made by study coordinator	6 m	practitioners affiliated with 1 academic medical Centre · 6 sites 55 sites· 127 HA and nurse providers	BMI%, nutrition activity history and counselling* but only after the office distribution of tools N proportion of children measured accurately after training in IV group (70% vs 34%)* with N accuracy* in RN group
Beno	Design and implementation of training to improve management of pediatric overweight.	2005	Overweight	Improve clinician skills managing pediatric overweight through skill-building of team	Georgia	MI-training & tools (guideline, BMI-charts and counselling guides)	Baseline	Assess health practitioners' attitudes following training and tools	3 m	Single MCP-9 sites, 76 participants	At 3 months N 60% clinicians agreed plotting BMI% was useful. Other tools received approval from 38 to 54% of respondents. b1/3 health practitioners responded PNs reported N identification of overweight and N use of tools.
Kopp	Proper exercise and nutrition kit: use of obesity screening and assessment tools with underserved populations.	2008	Overweight	Improve RN obesity screening skills by increasing knowledge and assessment of overweight	Underserved children (b21 years) in Kansas state	A mailed educational tool-kit with BMI-charts and counselling tools. 109/159 interviewed	Baseline	"Test use of screening tools"		159/500 RNs in public health, schools and clinics.	
Perrin	Bolstering confidence in obesity prevention and treatment counselling for resident and community.	2008	Overweight	To N confidence and frequency of counselling about weight, physical activity and lifestyle	21% white and 66% African Americans	MI-training & tools (BMI-charts and counselling guides)	Baseline	"Increase confidence in obesity counselling"	2–9 m	67/79 pediatricians/residents at 4 rural sites	Reported N confidence, ease and frequency of counselling*
Nicholas	Randomised controlled trial of a mailed toolkit to increase use of body mass index percentiles to screen for childhood obesity.	2009	Overweight	N use of BMI percentiles to screen for obesity	NY state	RCT of mailed toolkit (85/496 completed both surveys)	79/504 completed both surveys	"Increase use of BMI percentiles to screen for obesity"		Approx 1000 physicians	Routine use of BMI % in 2–5 y-olds increased by 50% in IV group*. Self-report and low response rate post IV
Keehbauch	Increased documentation and management of pediatric obesity following implementation of an EMR upgrade and education.	2012	Overweight	N proportion of children correctly documented and managed with overweight	50% minority/low-income	Stepwise IV-upgrade EMR+ training/tools 10 physicians 1150/1798 children	Upgrade EMR 9 physicians 1190/2311 children	Percent of overweight children documented, evaluated and managed	3 y	1 allopathic and 1 osteopathic (control) training practice	N documentation and management* of overweight following EMR upgrade, with greater change* at site with additional training (e.g. documentation-8.1%

Kubik	Providing obesity prevention counselling to children during a primary care clinic visit: results from a pilot study.	2008	Overweight/diet/exercise	Nproportion receiving annual BMI screening and counselling	Singlehealthcare organisation	Multi-component, whole of practice IV 74 parents (55% WCV)	43 parents (35% WCV)	Parent report measure - receipt of BMI classification and counselling	3 m	1 pediatric and 1 family (control) practice	EMR alone vs 10.5% with additional education). Baseline differences in sites Post-test only. Parents reported receiving more information* and more likely to receive lifestyle counselling at IV sites*
McKee	Implementation of a pilot primary care lifestyle change intervention for families of preschool children: lessons learned.	2010	Overweight/diet/exercise	Reduce lifestyle behaviours that place children at risk of obesity	1111 minority/low income families	IV testing risk assessment tool and referral to health educator 45/155 IV parents	166 control parents	Employed framework - reach, effectiveness (by parents), adoption (by clinicians) and implementation of tool	2 y	6 hospital affiliated sites, non-random assignment to IV and control groups- 14/17 IV-clinicians	Adoption: goals were set and referral was made in N 50% of children when risk assessment was completed. Effectiveness-ITT analysis no difference in adult or child behaviours. Suffered attrition bias.
Polacsek	Impact of a primary care intervention on physician practice and patient and family behaviour: keep ME healthy-the maine youth overweight collaborative.	2009	Overweight/diet/exercise	Improve clinical decision support and family management of risk factors	Maine-58% Medicaid and 10% underinsured or uninsured	QI quasi-experimental 341 children	378 children	Parent reports of behavioural screening and counselling (POM selected) and use of BMI measures by health practitioners	18 m	Self-selected pediatric practices-9/12 IV sites, 10/10-next wave of IV served as control	Nparent receipt of counselling*. NBMI assessment*(38–94%), BMI percentile (25–89%), weight classification* and use of behavioural screening tool* age group 5–18 y
Marsh-Tootle	Efficacy of a web-based intervention to improve and sustain knowledge and screening for amblyopia in primary care settings.	2011	Vision	Nknowledge and behaviours re. Vision screening	3 US states	RCT of web-based education 57/65 IV physicians	71 control physicians	Increase knowledge about vision screening	3 y	Physicians across 3 states	Short-term N knowledge*. Small sustained improvements (in a subset of 27/65 clinicians)* long term. Self-reported behaviours and high drop-out rate in IV
Slade	Training pediatric health care providers in prevention of dental decay: results from a randomised controlled trial.	2007	Oral health	Compare 3 forms of CME on provision of preventive dental services	Minority/low income	RCT 33/41 group B 37/41 group C (graded support)	37/39 sites (group A-lecture/demo only)	Rate of preventive dental service provision per 100 WCV	12 m	107/121 private practices in 1 state	8.5–12.9% visits incorporated dental after IV. No between group differences. "Early adopter" - practices, state-wide reimbursement and b fidelity of 50% practices in B and C, may have confounded findings.

Abbreviations: ASQ = Ages and Stages Questionnaire; ASQ: SE = Ages and Stages Questionnaire: social and emotional; CME = continuing medical education; EPSDT = early and periodic screening, diagnosis and treatment (preventive services delivered to Medicaid-eligible children in US); HA = health assistant/physician aide; MCP = managed care provider; PEDS = Parents Evaluation of Developmental Status; WCV = well-child Visits.

* p-value is less than 0.05.

through “Mechanisms” to the “Intermediate outcomes” and (ultimately) “Desired outcomes” obtainable in primary care. It provides researchers with information about what to assess when measuring the impact of primary care innovations and reveals the “strength of connection” between study outcomes and improved health (Mold, 2014).

3. Results

3.1. Study characteristics

The database search identified 743 titles from which 22 studies and two systematic reviews, furnishing an additional seven studies, were selected (Fig. 1). All of the studies identified by this search strategy were conducted in the United States (US).

3.2. Participants

Interventions were delivered by both health practitioners and office staff in primary care settings (e.g. community health centres, pediatric primary care centres, family practices). The number of sites ranged from less than five ($n = 8$) to N 100 sites in state-wide membership groups, with nine studies reporting between 5 and 20 sites (Table 2 and Supplementary File 2). Fourteen studies had 11 to 50 participants (Ariza et al., 2009; Brandt et al., 2013; Briggs et al., 2012; Dunlop et al., 2007; Hartmann et al., 2006; Hayutin et al., 2009; Keehbauch et al., 2012; Lannon et al., 2008; McKee et al., 2010; Minkovitz et al., 2003; Mold et al., 2008; Polacsek et al., 2009; Schonwald et al., 2009; Young et al., 2006) and twelve studies recruited 50 or more participants (Allen et al., 2010; Beno et al., 2005; King et al., 2010; Kopp and Hornberger, 2008; Laraque et al., 2009; Lipman et al., 2004; Margolis et al., 2008; Marsh-Tootle et al., 2011; Nicholas et al., 2009; Perrin et al., 2008; Shaw et al., 2006; Slade et al., 2007) (one not specified) (Kubik et al., 2008). One study had a single participant working from three sites (Hull et al., 2008) and a second study operated from a single site with less than ten health practitioners (Adams et al., 2003) (Table 2 and Supplementary File 2). Thirteen studies involved practice teams made up of a physician, another health practitioner (usually a nurse), and an administrative staff member. Only four studies detailed health practitioners' demographics (Laraque et al., 2009; Marsh-Tootle et al., 2011; Nicholas et al., 2009; Perrin et al., 2008) and 13 did not specify who actually delivered the intervention.

3.3. Population characteristics

Ten studies defined their communities as mainly African American/Hispanic/low income/underserved/ or Medicaid eligible (Adams et al., 2003; Allen et al., 2010; Briggs et al., 2012; Hull et al., 2008; Kopp and Hornberger, 2008; Marsh-Tootle et al., 2011; McKee et al., 2010; Polacsek et al., 2009; Schonwald et al., 2009; Slade et al., 2007) two indicated they were mainly white, college educated or high income (Hayutin et al., 2009; Kubik et al., 2008), the remaining 17 studies described diverse populations (Table 2 and Supplementary File 2).

3.4. HKC-component targeted

Of the 29 studies included in this review, 18 targeted a single aspect of preventive healthcare: 12 targeted overweight (growth, physical activity and nutrition) (Ariza et al., 2009; Beno et al., 2005; Brandt et al., 2013; Dunlop et al., 2007; Keehbauch et al., 2012; Kopp and Hornberger, 2008; Kubik et al., 2008; Lipman et al., 2004; McKee et al., 2010; Nicholas et al., 2009; Perrin et al., 2008; Polacsek et al., 2009), three targeted social and emotional health (Briggs et al., 2012; Hayutin et al., 2009; Laraque et al., 2009), two, vision screening (Hartmann et al., 2006; Marsh-Tootle et al., 2011) and one, dental health (Slade et al., 2007) (Table 2). The remaining 11 studies monitored growth and developmental milestones (Adams et al., 2003;

Allen et al., 2010; Hull et al., 2008; King et al., 2010; Lannon et al., 2008; Margolis et al., 2008; Minkovitz et al., 2003; Mold et al., 2008; Schonwald et al., 2009; Shaw et al., 2006; Young et al., 2006). One study also included adult preventive health targets (Mold et al., 2008).

3.5. Quality assessment

Quality assessment found that only six studies were rated medium or strong. Only two studies, one a RCT (Minkovitz et al., 2003) the other a controlled before and after study (Keehbauch et al., 2012), were rated ‘strong’. Despite this rating, this latter study was still confounded by baseline differences and was only tested in two sites. Four studies received a ‘moderate’ rating (Briggs et al., 2012; Hayutin et al., 2009; Lipman et al., 2004; Margolis et al., 2008). Uncontrolled before and after studies, pilot or feasibility studies, and the remainder were all rated ‘weak’ (Adams et al., 2003; Allen et al., 2010; Ariza et al., 2009; Beno et al., 2005; Brandt et al., 2013; Dunlop et al., 2007; Hartmann et al., 2006; Hull et al., 2008; King et al., 2010; Kopp and Hornberger, 2008; Kubik et al., 2008; Lannon et al., 2008; Laraque et al., 2009; Marsh-Tootle et al., 2011; McKee et al., 2010; Mold et al., 2008; Nicholas et al., 2009; Perrin et al., 2008; Polacsek et al., 2009; Schonwald et al., 2009; Shaw et al., 2006; Slade et al., 2007; Young et al., 2006). Seventeen studies used a before and after study design, three of which were controlled (Keehbauch et al., 2012; Margolis et al., 2008; Polacsek et al., 2009). One study had no comparison group (Hartmann et al., 2006) and one cohort study (Briggs et al., 2012), five controlled trials (Hayutin et al., 2009; Hull et al., 2008; Kubik et al., 2008; Lipman et al., 2004; McKee et al., 2010) and five randomised controlled trials (RCTs) (Marsh-Tootle et al., 2011; Minkovitz et al., 2003; Mold et al., 2008; Nicholas et al., 2009; Slade et al., 2007) comprised the rest. Most studies ($n = 17$) took between 6 and 12 months (Table 2).

3.6. Studies that employed theory

Seven of 29 studies reported interventions based on six theoretical constructs (Table 3) and three additional studies referenced the Quality Improvement (QI) framework they had used (Brandt et al., 2013; Lannon et al., 2008; Margolis et al., 2001). Seven studies described QI or Motivational Interviewing (MI) techniques without making theoretical constructs explicit, and a further 12 studies made no reference to theory.

3.7. Types of interventions

Twenty-four studies applied multi-component interventions, usually combinations of education and upskilling of health practitioners and training office staff to administer new tools (Dunlop et al., 2007; Hartmann et al., 2006; Hayutin et al., 2009; Kubik et al., 2008; Laraque et al., 2009; Lipman et al., 2004; McKee et al., 2010; Slade et al., 2007), often face-to-face in group formats and within learning collaboratives: 11 studies utilised QI models alone (detailed in multi-component interventions) (Brandt et al., 2013; Shaw et al., 2006; Young et al., 2006) or added office systems (Mold et al., 2008) tools (Allen et al., 2010; King et al., 2010; Schonwald et al., 2009) or both (Ariza et al., 2009; Lannon et al., 2008; Margolis et al., 2008; Polacsek et al., 2009). Other studies combined MI with training (Brandt et al., 2013) and/or tools (Beno et al., 2005; Perrin et al., 2008; Polacsek et al., 2009). Two studies used an electronic upgrade (Adams et al., 2003; Keehbauch et al., 2012) and four studies situated an expert in the practice (Briggs et al., 2012; McKee et al., 2010; Minkovitz et al., 2003; Schonwald et al., 2009).

The heterogeneity of study designs and topics studied precluded meta analysis so studies have been analysed according to single, step-wise and multicomponent interventions, in a narrative analysis.

Table 3
Studies using theory.

Theory/study	Kubic 2008	Perrin 2008	Marsh-Tootle 2011	McKee 2010	Laraque 2009	Ariza 2009	Polacsek 2009
Social cognitive theory	✓	✓	✓				
Socio-ecological approach				✓			
Adult learning theories			✓		✓	✓	
Theory of planned behaviour					✓		
Trans-theoretical model		✓					
Chronic care model							✓

3.7.1. Single-component interventions

Single-component interventions were tested in only five studies and results were limited by low response rates (Hull et al., 2008; Kopp and Hornberger, 2008; Nicholas et al., 2009), attrition bias (Marsh-Tootle et al., 2011; Nicholas et al., 2009) and single site interventions (Adams et al., 2003; Hull et al., 2008). A tool kit, aimed at increasing screening for obesity, was mailed to physicians and reported increased use of BMI percentiles in a RCT (Nicholas et al., 2009). However, a similar kit mailed to Registered Nurses (RNs), whilst well received, did not improve uptake (Kopp and Hornberger, 2008). A nurse protocol intervention (Hull et al., 2008) tested adherence to recommended preventive services delivered by a single practitioner against service-adherence from other health practitioners in the same geographical area. Significant improvement in service delivery was achieved by the nurse, but the single site of study and low response in the comparison group raise questions about generalizability. A RCT of a web-delivered educational intervention that sought to improve knowledge of vision screening, improved scores amongst intervention physicians (short term) and demonstrated how education could be standardised, but was less effective long-term and did not test actual changes in clinical practice (Marsh-Tootle et al., 2011). An Electronic Medical Record (EMR) (Adams et al., 2003) successfully increased the documentation of health and development but was limited by no control group and single-site of application. In addition, although construed as a single component intervention, because it operated across different modalities which were not specifically examined (prompt, decision support, streamlined data delivery), its actual mode of action remained uncertain.

3.7.2. Step-wise interventions

Stepwise interventions may provide additional evidence regarding effectiveness of single versus multicomponent interventions, particularly if studies are controlled. One intervention tested a specific electronic upgrade that automated BMI calculation (Keehbauch et al., 2012) in a controlled before and after study (only two sites). One site received training and decision aids to interpret and manage childhood overweight, in addition to the upgrade. This yielded a significant increase in documentation of overweight, counselling and ordering of lipids (increased management) over and above increases obtained by the upgrade alone. A second step-wise 'training and tools-intervention' that also targeted child-overweight, only documented significant changes recording BMI when office staff distributed tools after three months (Dunlop et al., 2007). This study did not have a control group and was also confined to a single organisation. Another study tested the step-wise provision of training in preventive dental-health delivery, with a second group receiving additional practice support and a third, hands-on training. On this occasion, there were no significant differences in outcomes across groups (Slade et al., 2007). According to study authors, new insurance rebates for preventive dental-health may have provided sufficient incentive for all groups to deliver services, thereby removing the effects of additional training and support.

Two QI programs performed step-wise analysis to look at the effects of goal-setting and improvement of preventive services, and obtained different results (Shaw et al., 2006; Young et al., 2006). Shaw's study

involved 31 sites and showed significant changes were only obtained in those practices that had identified a specific 'goal' for a preventive service (Shaw et al., 2006). In direct contrast, Young's study (14 sites) showed an inconsistent relationship between goal-setting and improvement (Young et al., 2006). Some preventive services may have been easier to implement than others, or a "ceiling effect" may have operated – i.e., the closer a practice is to optimal service provision at baseline, the harder it becomes to produce statistically significant improvements. Alternatively, a "wash-over" effect from QI processes could mean that services not selected as goals would also improve. Neither study had a control group (state-wide interventions) so could not attribute causation.

3.7.3. Multi-component interventions

Evidence from multifaceted interventions is discussed below. QI studies made up most of the multi-component interventions employed. Team based learning collaboratives typically benchmarked rates of preventive service delivery before receiving an educational/training component that ranged between 5 min and 4.5 days, depending on the study. Many interventions encouraged a lead physician to champion the intervention but tasks were delegated and responsibility for the intervention was shared across the practice. Momentum was maintained by technical and practical assistance and goal-setting provided a focus. Audits of clinical records were usually repeated by clinic staff, not researchers.

One QI intervention tested performance feedback, academic detailing, practice facilitation and IT support against feedback and benchmarking alone, in a RCT of 24 practices (Mold et al., 2008). The study included adult as well as child prevention and found more processes were implemented by intervention teams. Some larger controlled studies provide additional evidence: Polaczek's study adopted a long training duration (4.5 days) with 3-member teams from each practice and utilised the chronic-disease model of care, MI and the model for improvement to tackle child overweight (Polaczek et al., 2009). Materials were developed following extensive consultation and 70 records and parent interviews per site were collected before and during the intervention. Results demonstrated significant improvements in both parent reports and documentation of overweight. Control sites were not randomly allocated and intervention sites may represent "early adopter" selection bias. Margolis's cohort study of 18 practice sites consisted of three days training and all the components of the QI model for preventative and developmental health care delivery (Margolis et al., 2008). The study sampled surveys of three age-groups of children, parents' reports of quality of care and office systems inventories (17 control sites) and successfully demonstrated increases in all three.

Four studies tested the combination of health practitioners' training, provision of risk assessment tools and placement of a co-located specialist. Health practitioners in one pilot study participated in a workshop on obesity risk factors and a lifestyle counsellor was co-located half a day per week (McKee et al., 2010). Although health practitioners were more likely to document goals the study reported this was in part related to the availability of the lifestyle counsellor and highlighted the

challenges faced trying to change health practitioners' behaviours (McKee et al., 2010). Briggs' five year cohort study attempted to follow-up children every six months with the Ages and Stages Questionnaire (Social-Emotional) (Briggs et al., 2012). A specialist psychologist scored questionnaires following the visit and offered more comprehensive assessment, treatment and referral as appropriate. This study only managed to rescreen a third of children. Schonwald's QI study in two practices distributed 'Parents Evaluation of Developmental Status' questionnaires in the waiting room, provided an hour of health practitioner training and ongoing support via email (Schonwald et al., 2009). A specialist provided on-site secondary screening. The study was effective at increasing identification of selected behavioural and developmental concerns but did not lead to a significant increase in referrals. Minkovitz' large prospective controlled trial enrolled families (at birth) into home-visiting schemes, with supportive parent groups, telephone services, enhanced developmental services and specialists at intervention sites (Minkovitz et al., 2003). Odds of increased satisfaction (discussed later) and timely preventive care were doubled but the intervention did not impact hospital or emergency room visits, one of the primary outcome measures. These studies all included commentary regarding resource-allocation.

QI interventions without control groups were widely replicated. Success was generally measured in terms of increasing rates of use of SDS (Allen et al., 2010; King et al., 2010; Lannon et al., 2008) or BMI documentation and interpretation (Ariza et al., 2009; Brandt et al., 2013).

Other multi component interventions: Lipman's RCT of 55 sites to a two-hour training session (plus equipment) for intervention nurses, significantly increased the accuracy of linear measurement of children (Lipman et al., 2004).

1. A regional mental health educational intervention (plus toolkits) conducted surveys of physicians before and after intervention against a control group (not able to attend) and reported skills and knowledge improved significantly (Laraque et al., 2009).
2. Hartmann's vision screening project, tested whether guidelines could be implemented by both community lay-screeners and primary care clinicians. Large differences between screening groups and low referral rates from physicians led authors to conclude that alternative methods for preschool vision screening should be made (Hartmann et al., 2006).

3.8. Context

Although participants were often grouped according to intervention site, it was not always clear who actually delivered the intervention, particularly in QI style interventions where teams of health practitioners and office-staff each delivered intervention-components. Almost all encounters took place in the setting of "Well Child-Care" (WCC) consultations.

Two multicomponent controlled studies also tested interventions outside of WCC. Hayutin tested two social-emotional questionnaire scoring procedures, one parent- and one staff-scored, against a routine-care control group during non-emergency visits (Hayutin et al., 2009). Parents of children with more social-emotional problems rated better communication scores with health practitioners in both intervention groups, making an argument for conserving staff-time (through use of parent-scored questionnaires), but this was a small study. Kubik piloted an obesity prevention intervention during routine and well-child health visits in one practice, with a control practice providing usual care (Kubik et al., 2008). This "whole of practice" intervention (not QI) included reception staff handing out promotional materials, medical assistants recording height and weight and health practitioners interpreting BMI and counselling. Parents were more likely to report diet and exercise counselling from intervention-providers during both visit-types. These findings are important when considering preventive care outside of designated health assessments.

3.9. Health outcomes

Analysis of primary outcome measures according to primary care "Attributes", "Mechanisms", "Intermediate" and "Desired" outcomes found that only one study reported a "Desired outcome," the definitive category in Mold's logic model of primary care outcomes (Mold, 2014), 'Increased satisfaction with care' (Table 4) (Minkovitz et al., 2003). However, closer inspection revealed this was obtained from a series of questions that explored 'patient-centredness' (e.g. "Someone in the practice went out of their way for me"). In the Mold model this is more representative of an underlying "Attribute" of primary care. Additional outcomes for this study could be categorised according to the "Intermediate outcomes" of 'Improved functioning' (reduced harsh discipline) and 'More effective consultations/referrals' (Mold, 2014).

Table 4
Primary outcomes and their relationship to Mold's Primary Health Care Logic Model [43].

Attributes	Mechanisms	Intermediate outcomes	Desired outcomes
Coordination-internal/external Lannon et al., 2008*	Fewer medical errors Hull et al., 2008 Delivery/receipt of more preventive services Adams et al., 2003* Dunlop et al., 2007* King et al., 2010 Young et al., 2006* Mold, 2014* Shaw et al., 2006* Allen et al., 2010 Slade et al., 2007 Greater focus on outcomes McKee et al., 2010 Enhanced health practitioner's learning Perrin et al., 2008* Beno et al., 2005 Lipman et al., 2004* Kopp and Hornberger, 2008 Laraque et al., 2009* Nicholas et al., 2009* Marsh-Tootle et al., 2011* Greater understanding/better decisions Ariza et al., 2009*	Earlier detection/treatment Briggs et al., 2012* Schonwald et al., 2009* Brandt et al., 2013* Hartmann et al., 2006 Improved functioning Minkovitz et al., 2003* (duplicated) More appropriate, effective consultations/referrals Hayutin et al., 2009* Keehbauch et al., 2012* Kubik et al., 2008* Polacek et al., 2009* Margolis et al., 2008	Increased satisfaction with care Minkovitz et al., 2003* (discussed in text)

* Primary outcome reported as significant ($p \leq .05$) in the relevant study.

Eleven other studies shared the “Intermediate outcome” categories (Table 4). Remaining studies demonstrated primary outcomes representing the “Mechanisms” that underlie improvements to healthcare except for Lannon's study that measured an “Attribute”-improved internal coordination (office processes) (Lannon et al., 2008).

Only a small number of studies ($n = 6$) followed up families post intervention, noting that to do so required considerable effort and resources from participants and study personnel. These studies generally reported high attrition rates and only one study attempted to measure actual health outcomes for children. Briggs cohort study set out to follow-up the social and emotional health of children every 6 months for 5 years, but only managed to rescreen a third of children (Briggs et al., 2012). Of the 170 children who scored above risk cut-off scores 40% declined services, 22% were monitored, 14% (28) were referred and 24% received an intervention from the co-located specialist. Controlling for presenting problem, age, gender, and insurance type, treated children were four times more likely to improve scores than children whose parents had declined services. Two additional studies obtained outcomes data from parental reports: Polacek asked if parents had made behavioural changes with their children regarding overweight (68% response rate) and reported improvements in 12–26% (Polacek et al., 2009), and Minkovitz (response rate 67.2%) reported reduced measures of “harsh discipline” at intervention sites, an outcome the authors indicated was meaningful for positive child mental and socio-emotional development (Minkovitz et al., 2003).

Three other studies followed up children following screening interventions. One reported much lower than expected referral and treatment rates following vision screening interventions in both community and primary care practice settings (Hartmann et al., 2006). Similarly, studies by Schonwald et al. and King et al. failed to increase referral rates following interventions that introduced structured developmental screening (King et al., 2010; Schonwald et al., 2009). Findings suggested that families often never followed through because they did not understand the reason for their referral.

4. Discussion

In this systematic review we sought to identify primary care-delivered interventions aimed at preventive healthcare for preschool-aged children and analyse them according to their type, context, quality and primary outcome measure, to evaluate our own theoretically derived intervention. Twenty-nine studies relevant to the HKC (all of which were conducted in the US) were analysed in this review. We were unable to delineate the factors that clearly promoted preventive healthcare, finding that only two studies were of high methodological quality (Keehbauch et al., 2012; Minkovitz et al., 2003) and none demonstrated clear health benefits for children. Most interventions only increased rates of screening, recording and recognition of health risks (overweight/obesity, development and mental health) (89.7%), most employed complex, multifaceted interventions (79.3%) and only one could reasonably be categorised as ‘non-complex’ (Nicholas et al., 2009).

4.1. Multi-component interventions versus single-component interventions

Contrary to the findings of a recent study of systematic reviews (Squires et al., 2014) we found preliminary evidence in two studies that multi-component interventions were more successful than single component interventions (Keehbauch et al., 2012; Mold et al., 2008). In these controlled studies of step-wise interventions it seemed that it was the addition of an “active component,” inclusive of training, to a “passive component” [EMR upgrade (Keehbauch et al., 2012), feedback with benchmarking (Mold et al., 2008)] that helped to increase the delivery of preventive care. It may be that shared responsibility between health practitioners and whole of practice interventions encourages uptake.

4.2. Who leads may matter

“Quality Improvement-Learning collaboratives”, reflect this proposition and in this review achieved modest improvement in increasing the delivery of preventive health care for children (Margolis et al., 2008; Polacek et al., 2009). The North Carolina initiative to assist practices implement office process promote screening, achieved screening rates in N70% of visits (Earls and Hay, 2006). This QI initiative was eventually replicated state-wide and ultimately influenced Medicaid policy (Earls and Hay, 2006). According to the authors, the reason it was so successful, was that it was physician driven and convened state leaders (physician champions) capable of influencing health policy. This was also the finding of Van Cleave's systematic review (Van Cleave et al., 2012), one of two reviews detected by our search strategy, which was aimed at increasing preventive care across childhood. It concluded that multifaceted interventions based on QI methodology, were generally ‘more robustly studied and relatively effective’. A second systematic review of interventions that targeted improving health practitioners' obesity care of children, evaluated studies according to whether they included components of the Chronic Care Model (CCM) (Jacobson and Gance-Cleveland, 2011). The CCM also guides practice quality improvement and incorporates systems of delivery service redesign, clinical information and health practitioners' decision support (Wagner, 1998). Findings suggested that studies utilising CCM components increased the efficacy of patient outcomes (Jacobson and Gance-Cleveland, 2011).

The implication, therefore, is that for child preventive healthcare to become more generalised, requires:

- i) Practice interventions that encourage office modifications in addition to upskilling of personnel
- ii) Interventions that extend beyond individual behaviour change into the regulatory, socio-political environment.

Evidence from the RCT of an oral health prevention intervention supports this latter point, with significant differences obtained post intervention across all three intervention groups, independent of the grade of practice support, when reimbursement for preventive services came into effect (Slade et al., 2007). In Australia, the recent removal of Medicare time-based rebates, that incorporated practice nurse completed HKC-components, is expected to negatively impact delivery of the HKC (Alexander and Mazza, 2015). GPs left to take on the full burden will likely forego child preventive health for adult health checks, chronic disease management (both still supported by practice nurses) and the acute care needs of children, as happened in the United Kingdom (UK) (Wood and Wilson, 2012).

Another main finding from our review was how few studies followed up children's health outcomes following interventions. This was also noted by Van Cleave et al. (2012). Only six studies tracked children and reported referral rates (Briggs et al., 2012; Hartmann et al., 2006; King et al., 2010; Minkovitz et al., 2003; Polacek et al., 2009; Schonwald et al., 2009), observing that despite requiring significant resources there was considerable ‘dilution’ of clinical effects. Minkovitz, for example, reported reductions in punitive punishment as a positive health outcome but failed to show reduced hospitalisation rates, one of the primary outcomes (Minkovitz et al., 2003). Schonwald found practice capacity to manage social, emotional and behavioural problems increased, but acknowledged the (resource intensive) addition of an early-intervention specialist onsite (Schonwald et al., 2009). Future research would need to plan for adequate funding to offset attrition bias (Krzyzanowska et al., 2011) but is particularly important to gather because it has been found that families do not follow through with recommendations (King et al., 2010).

4.3. Limitations and strengths of the study

This systematic review found few high quality studies, therefore we cannot be certain that findings were wholly or even partially attributed

to the intervention. Studies that tested only one or two practice sites similarly limit the generalisability of their findings. Consequently, the evidence for interventions, directed at practitioners and their workplaces, is limited and there remains a large scope for additional research.

This systematic review and its scope presented methodological difficulties commonly encountered by researchers when attempting to synthesise data from complex interventions: 1) defining the intervention in the review; 2) searching for studies; 3) selecting studies for inclusion; 4) synthesising the data (Shepperd et al., 2009).

4.3.1. Difficulties defining complex interventions

Many interventions were inadequately described making it difficult to determine exactly 'who' had delivered 'what', with additional variation in the intensity of the intervention. For example, 11 studies employed QI methods, but the level of detail varied from comprehensive (Polacsek et al., 2009) to more generic (King et al., 2010) and training-duration ranged from 1 h (Schonwald et al., 2009) to 4.5 days (Polacsek et al., 2009). Supplementary evidence, through study protocols, qualitative and descriptive data, could be obtained to better define interventions (Shepperd et al., 2009). Reference to theory provides additional evidence and is the focus of a "Realist review", an alternative review methodology designed specifically to examine the "black-box" (what works, for whom, in what circumstances and how) that constitutes a complex intervention. A 'Realist review' would suit the complexity and breadth of the research question (and provide an interesting future research study) but is likely to require refocussing of the review question and extensive resources (Pawson et al., 2005).

4.3.2. Difficulties searching for studies

As a result of inconsistent terminology, the search strategy may have been compromised. Despite the use of multiple terms relevant to preventive health components of the HKC, we only identified studies from the US. Our search was limited to studies published in English, therefore may have excluded research from other countries and, due to resource constraints, did not examine the grey literature or references of selected studies. It still does not explain why UK based research was not retrieved. In the UK, health visitors, located in primary health networks distinct from traditional general practice, have a significant role in child developmental surveillance (Kuo et al., 2006). Specific search terms may be needed to ascertain intervention study designs that may have operated there.

4.3.3. Difficulties selecting studies for inclusion

Imprecise intervention-definition threatens the internal validity of the review as the selection of studies becomes both difficult to standardise and resource intensive (e.g. where decisions of inclusion/exclusion could only be met by scrutinising the full-text), and required considerable judgement (offset by consensus between 2 reviewers).

4.3.4. Difficulties synthesising the data

The low quality of the studies and heterogeneity of settings, participants and outcome measures meant we were unable to conduct a meta-analysis or draw firm conclusions about the type of intervention likely to be more successful.

5. Conclusions

This is the first systematic review of interventions targeting health practitioners working to improve preventive health for preschool children. We encountered many of the problems experienced by other researchers when reviewing complex interventions and found that the diversity of targets and primary outcomes and overall low study quality precluded meta-analysis. However, preliminary evidence from step-wise interventions and QI studies suggest that multi-component interventions and interventions that extend into the broader regulatory, socio-political environment, may be more effective.

This, together with conflicting evidence from systematic reviews of adult health assessments (Krogsboll et al., 2012; Si et al., 2014) reinforces the urgent need for additional high quality studies of interventions targeting both WCC and preventive healthcare within routine pediatric consultations, which should include follow-up of participants and clinical end-points.

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.ypmed.2017.02.024>.

Conflict of interest statement

The authors declare that they have none.

Authors' contributions

KA conceptualised the study, with guidance from DM and BB. KA conducted the systematic review and analysed the data with RB and KH. BB and DM critically revised the manuscript and all authors read and approved the final manuscript.

Sources of support

KA was supported by the Royal Australian College of General Practitioner's Chris Silagy Research Scholarship. BB received an Early Career Fellowship from the Australian National Health and Medical Research Council (NHMRC) and RB a Postgraduate scholarship, also from NHMRC.

Acknowledgments

Not applicable.

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Supplementary File 1. Search strategy MEDLINE for Systematic Review of Preventive Healthcare for Young Children

Healthy Kids Check - component	Relevant MeSH terms or key word encompassing preventive activity	MeSH or keyword in title encompassing primary care personnel	MeSH, keyword or additional limits on search encompassing intervention type
Height	Overweight/ obesity/ body weight/ body height/ growth charts/ growth disorders/ growth and development mp.	Family practice/ General practice/ Physicians, family/ Primary health care/ Nurse practitioners/ Nurse clinicians/ Advanced practice nursing/ Primary care nursing/ Allied health personnel/ Physician assistants/ General practi\$.ti. Family practi\$.ti. Nurse.ti. Physician\$.ti Primary care.ti. Family physician\$.ti	Intervention studies/ Clinical trials/ Quality improvement/ Trial\$.mp.
Weight			
BMI			
Eyesight	Vision ocular/ visual acuity/ vision disorders/ amblyopia/ strabismus/		
Hearing	Hearing/ hearing disorders/ hearing loss/ hearing tests/		
Oral health	Dental caries/ general practice, dental/		
Allergies	Hypersensitivities/ food hypersensitivity/		
Eating habits	Overweight/ obesity/ body weight/ body height/ growth charts/ growth disorders/ growth and development.mp.		
Physical activity			
Speech and language development	Speech disorders/ speech therapy/ speech-language pathology/ language development/ language developmental disorders/		
Fine motor skills	Child development/		
Gross motor skills			
Behaviour and mood	Child behaviour/ child behaviour disorders/ Autistic disorder/		
Social and emotional	Asperger syndrome/ attention deficit disorder with hyperactivity/ child developmental disorders, pervasive/		
Other	mass screening/		
	primary prevention/		
	child development /		
	developmental screening.mp.		
	developmental surveillance.mp.		
	developmental delay.mp.		
	early intervention.mp.		

Supplementary File 2. Detailed breakdown of participants and source populations- Studies Selected for Systematic Review of Preventive Healthcare for Young Children

Study	Participant source, number of sites and description	Description of Patient population	Participants described as clinicians/practitioners without specification	Participants specifies Drs/physicians	Participants specifies Nurses/nurse practitioners	Participants specifies Other HCAs	Participants included Office staff
Adams 2002	1 Paediatric primary care centre inner city Boston	(Primarily) low income, minority ethnicity. Child <5 y	2 additional clinicians	6	2 NP		
Allen 2010	164 Federally qualified health centres in Illinois 2873 participants	Underserved population Records retrieved from 1y, 18m and 2y WCVs	Not specified				Administrative staff
Hull 2008	1 nurse working 3 outpatient clinics within a single academic practice	514 new patients- low-income, largely minority, Medicaid-eligible 115 children enrolled from same community as control. Age 0-17 y			1 nurse		
King 2010	17/54 Paediatric primary care practices across 15 states	Diverse practice populations	Teams of 3	Paediatrician leader		Clinical support staff	Practice support staff
Lannon 2008	16 practices various types across 9 states Midwest US	Diverse cultures and socio-economic status Records of children 0-5 y	Teams to include senior leader in each practice	Not specified		Ancillary clinical staff	Administrative staff
Margolis 2008	53 paediatric and family practices (21 IV, 17 control) In Vermont and N Carolina	Parents in IV sites reported as more likely non-white, younger, less educated Children aged 3-48m	Teams				
Minkovitz 2003	15 paediatric practices located in 14 states	Data for children aged 30-33m 3737/5565 families	2 trained specialists per site	Not specified			

Mold 2008	94 practices in Oklahoma research network including 2 residency training sites	Mix of urban/suburban/rural practices		22 family physicians 1 internist		1 physician's assistant	
Schonwald 2009	1 Primary care paediatric practice (21 providers) and 1 community health centre (13 providers) in Boston	Predominantly urban Hispanic or African American served by Medicaid IV aimed at children 6m-8y	Mix of paediatricians, family physicians, and nurse practitioners	73% respondents female 63% physicians		Medical assistant	Clinic staff
Shaw 2006	35 practices Vermont	Approx 930 patients aged 2-4y	teams – 3 members	1 Physician/ team	1 nurse / team		1 administrative support/ team
Young 2006	14 practices Utah	Approx 544 patients aged 2-4y (40 records per team)	3 member teams	1 Paediatrician / team	1 nurse/medical assistant per team		1 receptionist /office manager per team
Hartmann 2006	28 primary care sites and Head Start and Community clinics across 4 states	2871 children aged 3 and 4y	Mainly nurses in primary care	Not specified	Not specified		lay personnel in community clinics
Briggs 2012	Federally qualified health centre affiliated with academic medical centre	Predominantly Hispanic or African American, Medicaid 4954 children aged 6-36m	Study employed a psychologist	13	1 nurse practitioner + RNs	Included 30 residents, 1 social worker, 1 nutritionist	
Hayutin 2009	1 primary care group practice 1 pediatric gastroenterological practice	289 Parents of children aged 4-16y high income group, predominantly white and married		12 paediatricians			
Laraque 2009	409 clinicians and members of AAP - Pediatric primary care physicians in direct primary care	3 States impacted by a regional disaster Age range not specified- included screening children from aged 4	Descriptors >70% female; > 60% white				

Ariza 2009	4/5 primary care practices- 2 Federally qualified health centres 2 private practices	Diverse populations. 320 Parents of children aged 0-17y	Leadership teams-2-6 clinicians per site	7 interviewed			
Brandt 2013	5 practices around New Mexico 21 paediatricians	Mix of practices -1 practice high population American Indians Children aged 2-18y		Not specified			
Dunlop 2007	6 community based primary care clinics affiliated with an academic medical centre 44 providers	Children aged 2-17y 1348/5214 records of WCVs		17/18 Paediatrician s and family physicians	2/2	19/24 Family medicine residents	Not specified
Lipman 2005	44 paediatric and 11 family practices 127 Nurse participants	8 geographically distinct US cities Approx 900 children 0-18 y			26 RNs 29 LPN	72 nurses aides or medical assistants	
Beno 2005	Single insurer, 9 sites, 101 pediatric team members	State of Georgia	Teams of 6-17 members	23 physicians	18 RN 6 Nurse practitioners / Physician assistants	33 LPN and Medical assistants	Office staff receptionist s
Kopp 2008	Registered nurses training programme 500 nurses surveyed	Underserved population in Kansas. Youth < 21 years			159 paediatric, public health and school based nurses		
Perrin 2008	Paediatric continuity clinic and 4 rural community practices in N. Carolina. All staff encouraged to attend training IV	21% white and 66% African Americans insured by Medicaid or uninsured	Good descriptors: approx. 80% female /Caucasian	18/27 physicians 49/52 residents			
Nicholas 2009	Approx 1000 physicians NY State surveyed	Children Aged 2-20y in New York State	Good descriptors: approx. 40% female / private group practice	463 family physicians 537 Paediatric- ians			

Keehbauch 2012	1 allopathic practice 10 physicians 1 osteopathic practice 9 physicians	Approximately 50% African American/ Latino low income children 2-19y Approx 1150 children each arm		19		70-80 residents	
Kubik 2008	2 clinics in 1 health care organisation: 1 pediatric clinic, 1 family medical practice	Suburban communities –mostly white, college educated families Targeted 117 parents of children 5-10 y		Not specified	Not specified	Support staff	Reception staff
McKee 2010	6 hospital affiliated sites - members 1 research network in NY-Bronx Family physicians, paediatricians and internists	1111 Low income minority families 674 children aged 21-42m completing 1102 visits at IV site	Champion clinician 17 IV PCPs		nurses	Medical assistants	Office staff = front desk
Polacsek 2009	22 practices including 1 pediatric and 1 family practice residency program, 9 primary care pediatric practices, 1 family practice	Urban and rural Maine Underserved population Approx 350 parents of children 5-18y baseline and 380 during study	3-member multi-disciplinary team 17 providers	Not specified	Not specified		Team includes adminis-trator
Marsh-Tootle 2011	136 primary care providers across 3 states (full description) in family or paediatric practices	Receive Medicaid services children aged 3-4y		Approx. 50% white, 60% male, 65/35 % pediatric/ family practice			
Slade 2007	121 Private pediatric and family physician practices in N Carolina	Medicaid-enrolled children aged 0-3y	323 medical personnel	Minimum 1 physician/ site. 171 physicians	Not specified	Not specified	152 medical office assistants

LPN= Licensed Practice Nurse; RN = Registered Nurse; WCV= Well Child Visit

Search strategy

Full text articles were initially scanned without regard to study quality or intervention outcomes, so that all potential Intervention Functions/ Behaviour Change Techniques could be considered. However, the final synthesis only included interventions that targeted individual behaviours or the practice environment (red layer of the BCW) and did not analyse interventions outside of local context (grey layer of BCW). The initial focus on Behaviour Change Techniques was removed from the final publication, due to the complexity and constraints of article size, but is included here (Table 5).

Intervention Functions utilised in studies

This systematic review sought to identify interventions that aimed to improve components of preventive healthcare for children of preschool age, and analyse them according to the “Intervention Functions” contained in Michie’s BCW (Michie et al., 2011). I wanted to know if I could determine which Intervention Functions were more likely to be successful in the context of HKCs in Australian general practice (Table 5). Of the 29 studies ‘Environmental restructuring and ‘Training’ were the Intervention Functions most commonly incorporated (100 per cent and 86.2 per cent respectively). The function of the intervention amongst twenty one studies (72.4 per cent) was ‘Education’; ‘Incentivisation’ for 16 (55.2 per cent) studies (using benchmarking, goal setting or reimbursements) and ‘Persuasion’ for 15 (51.7 per cent) studies. Another 16 (55.2 per cent) ‘Enabled’ change by adding additional supports and six (20.7 per cent) studies ‘Modelled’ behaviours. Two Intervention Functions were not employed in any study – ‘Coercion’ and ‘Restriction’.

Table 5. Paediatric preventive health intervention studies against BCW-Intervention Functions

Study title	Intervention description	Ed	P	I	C	T	R	En	M	E
Adams 2002	Introduction of Electronic Medical Record (EMR). Two hours training, graded implementation and support from research assistant. EMR served as prompt with potential to save practitioner time					√		√		√
Allen 2010	QI-style program -academic detailing using peer educators, use of SDS tools (ASQ and ASQ:SE), written materials, referral information, access to experts, and monthly technical support. Program set targets, monitored change and provided feedback and addressed cultural barriers	√	√	√		√		√		√
Hull 2008	'Preventive Nurse' administered practice protocol based on expert guideline for integrating and documenting preventive services			√				√		
King 2010	QI-style pilot program to implement series of recommendations from AAP. One-day workshop introduced policy statement and system to implement SDS. Included communication with payers, collaboration with community programs, data collection, feed-back of reports and practice support. Practices remunerated US\$1800	√		√		√		√		√
Lannon 2008	Team based learning collaborative to increase quality of services with an emphasis on office support systems. Workshop, introduction to office systems, SDS tools, community linkage, collection and feedback of data with run charts, support, coaching and shared learning. Employed PDSA cycles	√	√	√		√		√		√
Margolis 2008	QI program emphasising practice systems designed to respond to parent developmental and behavioural concerns. Three X 1 day training for change and improvement strategies including office inventory, SDS, psychosocial screening, community referrals, data collection and feedback with coaching towards target goals	√	√	√		√		√		√
Minkovitz 2003	RCT of "Healthy Steps"-family intervention included home visits, colocated specialists, telephone help line, developmental assessments, written materials, support from parent groups and linkage with communities. Site personnel attended 3 annual training sessions, received written protocols and manuals, support through teleconferences and training in evaluation procedures	√				√		√		√

Mold 2008	QI-style intervention –established protocols, recall and reminder office systems, audit and feedback with benchmarking, academic detailing, practice facilitation and IT support. Control sites- feedback with benchmarking alone.	√	√	√	√	√	√
Schonwald 2009	1 hour training using PEDS, included referral pathways, parent handouts and ongoing support as required. Medical assistants handed screening tool to parents (with guided text) in waiting room. A secondary screening service provided developmental assessment at each site, with partial reimbursement			√	√	√	√
Shaw 2006	Test the effectiveness of a QI program to > preventive services QI-style Learning collaborative	√	√	√	√	√	√
Young 2006	Test if a learning collaborative can improve preventive service delivery QI-style Learning collaborative	√	√	√	√	√	√
Hartmann 2006	Implementation of vision screening recommendations training with established tools for assessment of vision. Competitive tender to join study.			√	√	√	
Briggs 2012	Colocation of psychologist who scored standardised questionnaires distributed by nursing staff to family in waiting room (trained). Above cut-off score, child invited for comprehensive S-E behavioural assessment and offered treatment in consultation with clinician				√	√	
Hayutin 2009	Intervention tested parent- scored PSC (reduces staff burden) against staff-scored PSC or usual care. Clinicians received 5 minute individual instruction regarding PSC scoring and interpretation. Parents also encouraged to communicate S-E concerns				√	√	
Laraque 2009	Educational intervention delivered by experts-interactive session, role play and motivational techniques (if-then plans) plus networking lunch lasting 2 hours accompanied by a “preliminary toolkit”. Incentive of CME points and ‘final’ tool-kit	√		√	√	√	√
Ariza 2009	QI framework: leadership team, modifying clinic environment, educational meeting about childhood overweight, tools to support growth interpretation (e.g. BMI calculator) prompts and handouts. Tailored to practice	√	√		√	√	√

Brandt 2013	QI framework and use of PDSA with goal setting: 4 hour training and education, included motivational interview training, leadership team, twice monthly specialist tele-health clinic with case presentation and support as required (non-collaborative)	√	√	√	√	√	√
Dunlop 2007	Step-wise intervention. Initial peer-training and distribution of nutrition and physical-activity tools. Two 1-hour training sessions, included role-play, inclusive of BMI calculator and growth charts. 3 months later- office staff training to distribute tools to parents in the waiting room (and prompt clinician)	√	√		√	√	√
Lipman 2005	2 hour education program incorporated importance of accuracy, demonstration and return demonstration by participants. State-of-the-art measuring equipment supplied.	√		√	√	√	√
Beno 2005	Improve clinician skills managing paediatric overweight through skill-building of team BMI education/ training and role play, brief MI training with tools	√	√		√	√	√
Kopp 2008	Improve RN obesity screening skills by increasing knowledge and assessment of overweight BMI education with tools	√				√	
Perrin 2008	To > confidence and frequency of counselling about weight, physical activity and lifestyle Brief training in MI with tools				√	√	
Nicholas 2009	> Use of BMI percentiles to screen for obesity Mailed toolkit with instructions and links to training modules. Also included guidelines and letter endorsed by medical leaders.	√	√			√	
Keehbauch 2012	Upgrade in an electronic medical record generated a BMI percentile. 12m after upgrade IV-site in addition received 2 X 1 hour educational intervention, decision aids, pocket algorithms and wall charts. Encouraged to include "obesity/overweight" in problem list	√			√	√	
Kubik 2008	Multi-component intervention consisting of waiting room brochure, notice boards and games aimed at facilitating discussion with parents. Office staff measuring height /weight, healthcare providers categorising BMI and provided counselling.				√	√	

McKee 2010	Intervention testing a family lifestyle risk assessment tool. Clinicians attended workshop with emphasis on leadership role, case studies and training in goal setting and behaviour change using screening tool and 5 A's approach and could refer to lifestyle counsellor (on-site half day per week).	√	√		√	√	√
Polacsek 2009	Three X 1.5 day training sessions with baseline chart data and QI model. Included leadership roles, specific education about negotiating with patients, guidelines, clinical decision making tools and ways to track outcomes of referrals. Practice teams supported with collaborative telephone calls and site visits	√	√	√	√	√	√
Marsh-Tootle 2011	Educational intervention used interactivity, case studies, video, authoritative source, toolkits, tracked behaviours and presented feedback to increase motivation. Text book and CME as incentives	√	√	√		√	√
Slade 2007	CME (90 minutes)-included training and application of Fluoride varnish using model. Samples and parent information also supplied. Second group (B) received learning collaborative support, third group (C) received on site support, additional training and demonstration as required. All consultations reimbursed as new state-wide incentive	√	√	√	√	√	√

BCW = Behaviour Change Wheel; Ed = Education; P = Persuasion; I = Incentivisation; C = Coercion; T = Training; R = Restriction; En = Environmental restructuring; M = Modelling; E = Enablement

Analysis of Intervention Functions in single-component interventions

Only five studies contained single-component interventions, making these the most amenable to analysis of the Intervention Functions they contained (Adams, Mann, & Bauchner, 2003; Hull et al., 2008; Kopp & Hornberger, 2008; Marsh-Tootle et al., 2011; Nicholas, Dennison, de Long, Prokorym, & Brissette, 2009). Two of these posted a tool-kit to practitioners to facilitate management of child overweight/obesity (Kopp & Hornberger, 2008; Nicholas et al., 2009). However, on closer inspection these ‘non-complex’ interventions also contained guidelines (Education) and a letter endorsing the kit (Persuasion) and therefore operated through a number of Intervention Functions. In another single-component intervention-study, a nurse protocol tested adherence to recommended preventive services delivered by a single practitioner (Hull et al., 2008). The probable Intervention Functions in this case were ‘Incentivisation’ and ‘Environmental restructuring’. The other two single-component studies examined the effect of electronic-interventions. The first, a RCT of a web-delivered educational intervention that sought to improve knowledge of vision screening, also operated via *multiple* Intervention Functions (Incentivisation, Motivation, Environmental remodeling) (Marsh-Tootle et al., 2011). The second, the deployment of an Electronic Medical Record (EMR) also operated across different modalities (prompt, decision support, streamlined data delivery) so that its actual mode of action was not clear (but allocated to Intervention Functions: Training, Education and Environmental restructuring) (Adams et al., 2003).

Which ‘Intervention Functions’ work best in preventive healthcare of young children?

The two studies that were ranked ‘strong’, in terms of evidence, employed three common Intervention Functions: ‘Education’, ‘Training’, and ‘Environmental restructuring’ (Keehbauch et al., 2012; Minkovitz et al., 2003). However, many studies that also employed these Intervention Functions were rated low quality. Therefore, there does not appear to be any relationship between the quality of the study and the Intervention Functions used. Several studies that reported methods based on “Quality Improvement- Learning collaboratives,” achieved modest success despite low levels of evidence (Intervention Functions- Education, Persuasion, Incentivisation, Training, Environmental

Remodelling and Enablement). For example, the North Carolina “Assuring Better Child Health and Development (ABCD) Project” that aimed to “*assist practices in implementing an office process for screening*” achieved screening rates of more than 70 per cent of visits (Earls & Hay, 2006). An initiative that began in practices that self-selected to participate (therefore were motivated to change) was readily taken up, replicated state-wide and ultimately influenced Medicaid policy (Earls & Hay, 2006). The reason it was so successful, according to the authors, was that it was physician driven, and convened state leaders (physician-champions) capable of making or influencing policy changes. The implication, therefore, is that for child preventive healthcare to become more generalised requires interventions that extend beyond the confines of individual or practice-led behaviour, into the regulatory, socio-political environment that is categorised within the outer rim of the Behaviour Change Wheel (see Limitations of the Systematic Review).

Reporting Outcomes from Interventions

Early on in the compilation of this review it became apparent that the heterogeneity of interventions and measured outcomes, meant meta-analysis was not possible. The problem of comparing studies across interventions was also recognised by Coker’s systematic review (not identified in our systematic review) of strategies for the redesign of ‘Well Child Care’, which reinforced the need for “*a commonly defined set of child and parent outcomes to help researchers build capacity*” (Coker et al., 2013).

I decided to report the outcomes of preventive interventions for young children, as a method of trying to determine the impact of each study included in our review, using Mold’s model (2014). This ‘Logic model’ was created out of a perceived need to explain to a range of stakeholders – politicians, researchers and medical students – how primary care was fundamentally different from other medical disciplines and “why more and better primary care produces better health outcomes at lower cost” (Mold, 2014) (Figure 8). Our systematic review found most studies report outcomes situated proximally in the model (Mechanisms and Intermediate outcomes) and few studies followed patients after interventions. Our exposition of Mold’s Model, as part of a paper presentation at a primary care

research conference, received considerable positive feedback from the audience (Alexander, Brijnath, & Mazza, June 9, 2016) and our publication was the first body of research to cite it, despite widespread dissemination on the website of the North American Primary Care Research Group with an accompanying “Prezi” presentation (Drew, Lienke, & Mold, 2014). The acclaim it received suggests that future research will benefit from its application to evaluate primary care interventions in any field of general practice.

An alternative framework to report outcomes has been developed by the Cochrane collaboration (Effective Practice and Organisation of Care (EPOC), 2017). Patient outcomes include physical and psychosocial health status and wellbeing (e.g. morbidity, physiological and quality of life measures) and reports on health behaviour (e.g. adherence to treatment, health seeking behaviours). Other outcomes include: quality of care (adherence to recommended practice or guidelines); service utilisation, coverage or access; resource use; provider outcomes; social outcomes; equity and adverse effects. They state that impacts on equity and adverse effects should be reported for all reviews. Secondary outcomes are deemed ‘not critical’ but may be ‘of interest’, enabling researchers to establish selection criteria based on whether a study *only* reports secondary outcomes. Knowledge; attitudes; performance in a test situation and satisfaction (patients or providers) are examples of secondary outcomes.

Several studies would have been eliminated from our review if I had only included studies reporting ‘primary’ outcomes (Beno, Hinchman, Kibbe, & Trowbridge, 2005; Kopp & Hornberger, 2008; Laraque et al., 2009; Marsh-Tootle et al., 2011; Perrin et al., 2008) (outcome measures that improved clinician knowledge). This would not have affected our conclusions, but in the model I chose, Mold’s model, “Enhanced clinician learning” is interpreted as a *Mechanism* underpinning the intermediate outcomes of good quality primary care. Addressing equity, only one study selected a high income population (Hayutin et al., 2009) and a second examined an intervention applied through a single healthcare organisation (Kubik et al., 2008) whilst the rest stipulated minority diverse or state-wide interventions.

Adverse effects were rarely reported in primary studies (e.g. increased duration of a visit by a mean of 9.3 minutes (Adams et al., 2003)), therefore could not be generalised in this review.

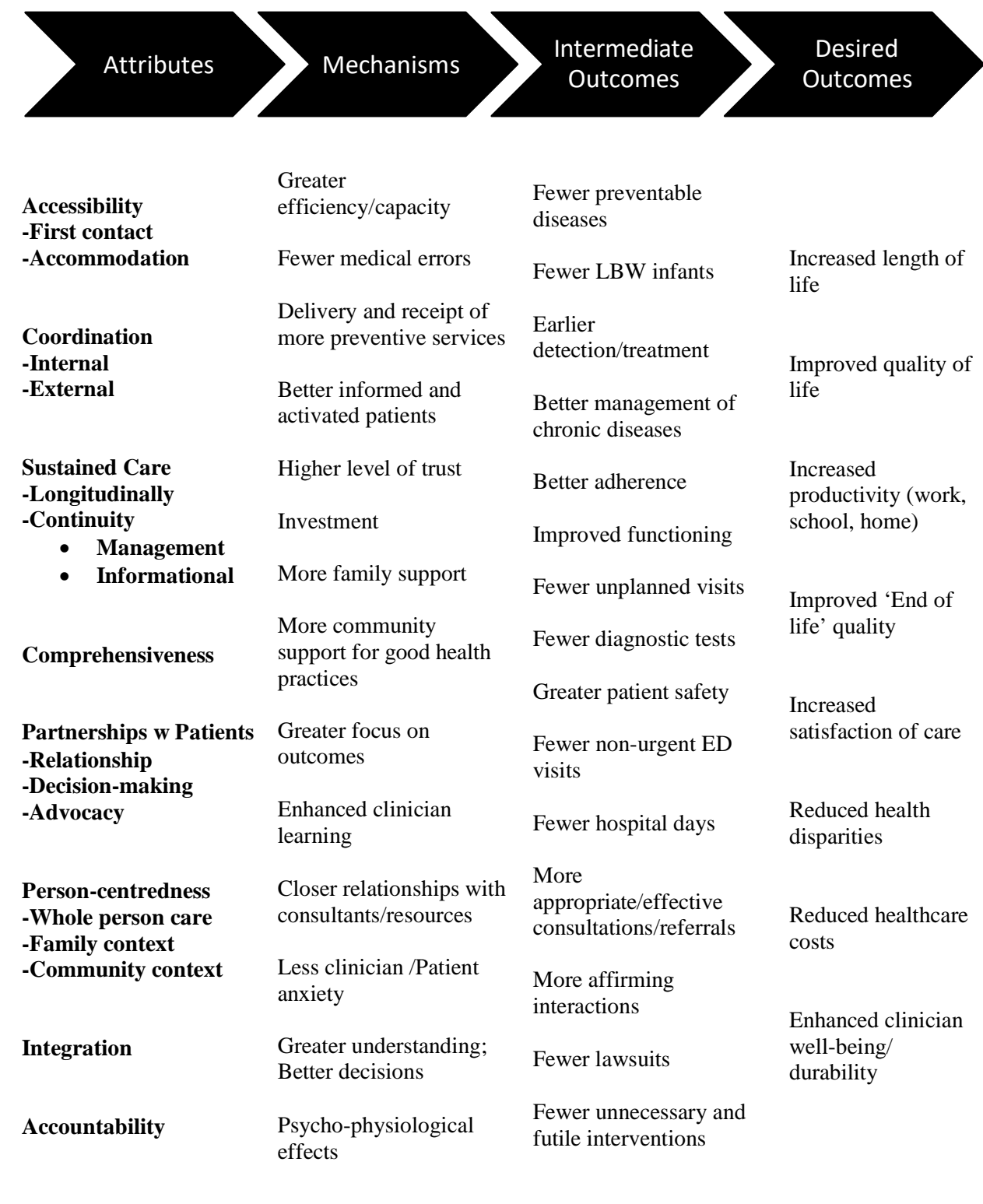


Figure 8. Mold's Model of Primary Care Outcomes

Chapter 7. Discussion

Key findings

Recognising that children suffer preventable health conditions from a young age, yet receive low levels of preventive healthcare from general practice, the aims of this research were to design an intervention that could override the barriers to preventive healthcare for young children (including Healthy Kids Checks).

The achievements of this thesis have been to:

1. Complete exploratory qualitative research that included the perspectives of parents, general practitioners and practice nurses, and canvassed the opinion of significant stakeholders- Paediatricians, Maternal Child Health Nurses and leaders in primary health, to uncover the barriers that were hampering the full uptake of a practitioner delivered child health assessment.
2. Then, guided by the MRC Framework for Complex interventions (Craig et al., 2008), a 'whole of practice' intervention was designed to override obstructions and lift the quality of HKCs from general practice. The majority of components of the intervention proved feasible in the pilot study and the proposed multi-component intervention aligns with similar interventions already tested in the US. Potentially, this complex intervention would be able to concurrently improve several aspects of child preventive healthcare.
3. Methodologically, this thesis has documented and critiqued cutting edge implementation science methodology and provides a basis for further interventions in general practice to proceed along similar pathways. In so doing it provides one of the earliest detailed accounts of use of the Theoretical Domains Framework and Behaviour Change Wheel in primary care. This represents a significant contribution to this field of research. Future research should garner detail of the specific ingredients that best serve the design of general practice-complex interventions and streamline the processes uncovered in this body of work.

From this exposition I have arrived at a number of conclusions that I will elaborate according to participant groups and context.

First, parents are cognisant of the need to attend primary care for the immunisations that intersperse the child's early years up to school entry. They generally welcome professional input regarding growth and development during the child's infancy, but this tends to drop off after the first year and with children born after the first child. The majority of our sample of parents were not working full-time (and this data was not sought specifically), but despite this, parents looked to streamline their children's healthcare. The schedule of ten key CFHN preventive visits for each child by 3.5 years was possibly too onerous for some but this study, and the work of others (Garvis et al., 2016), points to parents' preference for agencies to proactively assist them when their child's development appears out of step with their peers rather than reduce preventive health to a 'tick-box' exercise. Therefore, child health surveillance needs to be able to identify children who may be at risk (sensitive), classify normal children as developing typically (specific), must be repeatable (as the child matures) and not overburden families' or health services' resources.

While the HKC did have problems with its evidence base, and as a single item did not fulfil criteria for child surveillance, it provided a starting point for the delivery of health promotion and prevention services, protected from the confounding effect of acute illness. Unfortunately, following the abolition of HKCs, children's reduced exposure to mandatory health checks may jeopardise parent participation in GP-child preventive health and developmental surveillance. Current levels of child preventive health consultations in general practice remain unknown (and should be the focus of future research), but, as the spotlight swings away from preventive health in general (the National Partnership Agreement on Preventive Health ceased to operate from 2014) and HKCs in particular, without a specific health check, Australian GPs will 'miss opportunities' to manage conditions like childhood overweight. Maintaining skills in preventive healthcare will require designated education and training, especially given the fact that concerns have already been raised about the lack of exposure to paediatrics both at under-graduate and post-graduate levels (Modi & Simon, 2016). For example,

responsibility for the social-emotional care of children, mediated through education and training, is closely related to levels of confidence and skills experienced by GPs (Miller, Johnston, Klassen, Fine, & Papsdorf, 2005).

Questions have recently been raised about parents' confidence in GP-skills relating to child health (Freed et al., 2017), and risks further erosion, as child health surveillance becomes the domain of specialist nursing services (CFHNs), outside of general practice. Evidence from two studies presents a case that Victorian parents may lack confidence in GP-skills to deliver child healthcare (Turbitt & Freed, 2016; Freed et al., 2017). A study of 1146 parents of children under nine years attending the emergency department (of one of four Victorian hospitals) for low-urgency conditions, found one in five children had no regular primary healthcare provider and those children's parents were more likely to perceive attending the emergency department as more convenient than attending general practice (Turbitt & Freed, 2016). Moreover, the likelihood of having a regular GP was lowest amongst parents with lower household incomes and lower levels of education – families more often suffering poorer health than the general population (Turbitt & Freed, 2016). A second study of approximately 600 parents attending two Victorian public hospital outpatient departments with their children, examined their beliefs about seeking specialist opinions for common paediatric problems (Freed et al., 2017). It found that only 45 per cent of parents had *complete* confidence in their GP's management of children's health problems, 40 per cent preferred to see a paediatrician about *any* child health issue, 25 per cent only visited their GP for a referral to a paediatrician, and only 25 per cent expected to follow-up care with their GP. This study has received some criticism for selectively reporting outcomes (another 45% of parents were *mostly* confident) (Kruys 2017) but concluded that GPs and specialists needed to work together to coordinate the healthcare of children and promote better interaction between primary and secondary care. The reasons children are presented to the emergency department and not the GP are more complicated than the implied lack of confidence in general practice (Peltz et al., 2017, Ogilvie et al., 2016, Costet Wong et al., 2015). Nevertheless, any interventions that build capacity in preventive healthcare, particularly through shared educational, training or consultation experiences, will likely enhance its delivery and will build communication and inter-professional networks.

PNs may have an important role to play in this inter-professional network because as my research

with GPs found, most GPs preferred to delegate the assessment processes associated with the HKC to the PN. Whilst HKCs were operating, an annual survey of 1000 GPs revealed an increased rate of general check-ups for children [1.9 (1.7-2.1) encounters per 100 child-visits in 2000-03, increased to 4.7 (4.4-5.0) encounters per 100, in 2012-2015] (Bayram, Harrison, Charles, & Britt, 2015). In the UK, changes in the 'Child Surveillance System' that reduced the frequency of checks and moved Health Visitors (a professional nursing group equivalent to MCHNs) out of general practice into regional hubs, led to an overall decline in child preventive care in general practice (Wood & Wilson, 2012). PNs, taking on HKCs, recognised omissions in their own training and many sought to remedy this. With the withdrawal of the HKC, PNs have lost the impetus to advance their child-health expertise or even maintain new-found skills. It is probable, though I do not have research evidence, that PNs are no longer performing *any* child health checks in general practice and this is a loss to their profession, general practice and the community as a whole. In the new context of 'Patient-Centred Medical Homes', where care-coordination may become the realm of the PN (Royal Australian College of General Practitioners, 2016b), it will be important for PNs to feel confident managing the needs of the entire age-range of a practice population. Vaccination services, often delivered by PNs, could present new opportunities for PNs to maintain child assessment skills, although, currently, these are not rebated by Medicare. PNs, therefore, need age-specific, efficient screens that they can skilfully deliver at each child contact. Additional training could be offered through Primary Care Networks using combinations of face-to-face and web-based, group-training sessions and/or practice visits.

An Exposition of the TDF and The Behaviour Change Wheel

This research provides a thorough exposition of the research methodology behind the TDF and demonstrates how Michie's Behaviour Change Wheel could be applied to other interventions in general practice. A brief analysis of how other researchers have employed this methodology provides possible alternative applications of this framework to the problem of increasing preventive healthcare for young children.

Craig et al.'s (2016) systematic review researched the enablers of six key clinical behaviours of stroke (including triage, monitoring glucose levels, managing temperature and patient-transfer) according to TDF domains. The HKC could have been similarly 'broken down' into its component behaviours, for example: identifying eligible children, measuring (height and weight), documentation (of BMI) and interpretation (of BMI as underweight, normal, overweight or obese). This may have helped me to identify the HKC-related behaviours that were regarded as more salient to GPs and PNs, and hence more likely to be retained in clinical practice following abolition of the HKC.

Murphy et al.'s study of dementia management amongst Australian GPs used a two-step process to determine their current practice regarding cognitive screening (Murphy et al., 2014). Users and non-users of a validated assessment tool (Mini-Mental State Examination) were grouped together, and content analysis of interview transcripts, guided by TDF categories, explored why GPs may or may not have practiced according to recommended guidelines. I could have applied this methodology if I had explicitly collected data regarding the number (if any) of HKCs completed by practitioners. Focus groups could then have been divided according to 'high-users' and 'low-users' of the HKC, to explore group differences. The large discrepancy in delivering HKCs only became apparent as focus groups progressed, but as a technique is probably less relevant to focus groups (than individual interviews) because participants trigger discussion as they share their experiences.

Our pilot study attempted to establish some preliminary measures of adherence to the study protocol by including a checklist from which the research nurse could mark off whether component Behaviour Change Techniques had been delivered. As a measure of study-fidelity, future studies could utilise questionnaires based on the TDF to evaluate which domains were applied in more successful implementation studies. This method was used to evaluate which domains were most influential to the success of a chest-pain risk assessment tool in the emergency department (Skoien et al., 2016) but was thwarted by high mean responses across *all* of the theoretical domains.

There is an expanding body of work that has reported the stepwise development of interventions using the TDF, but few studies are confined to variegated and fragmented systems of primary care like

Australia's. Three examples of primary care interventions that utilised this methodology, also applied seven or more of the TDF domains to the design of their interventions (French et al., 2013, Porcheret et al., 2014, McKenzie et al., 2013). The domains: Knowledge, Skills, Beliefs about Consequences and Beliefs about Capabilities were common to each study, including our own. As experience with the use of TDF and Behaviour Change Wheel increases within specific subgroups of end-users (e.g. GPs) matrices could be devised and tailored to select the Behaviour Change Techniques deemed most likely to be successful (Cane, Richardson, Johnston, Ladha, & Michie, 2015). The question arises, however, as to whether the domains common to barriers analyses with primary healthcare practitioners are the same as those found with all healthcare practitioners, or, indeed, everyone in any health sphere? Our research found only two Intervention Functions did *not* apply to the development of our intervention – Restriction and Coercion – and that is likely because my analysis was concentrated at the level of the practice and patient-provider interactions, as opposed to the coercive and restrictive effects of broader policy levers (e.g. linking the HKCs to mandatory school readiness checks or to low-income families availing of family tax benefits).

The selection of Behaviour Change Techniques is one of the most onerous tasks facing researchers using the Behaviour Change Wheel. Categorisation of the Taxonomy helps with selection but, as Michie indicated, “it is essential to be guided by the definition (of the Behaviour Change Technique) not the label” (Michie, van Stralen, & West, 2011). The TDF and Behaviour Change Wheel are proposed solutions for researchers who do not necessarily have expertise in behavioural change. Nevertheless, without a deeper understanding of the constructs of psychological theory, the selection of Behaviour Change Techniques becomes highly subjective, predisposed to being reductionist, ignores the broader socio-political contexts, and, therefore, is likely to be flawed (Francis, O'Connor, & Curran, 2012). Claims of increased rigour have been made where studies have included behavioural scientists in the research team (Tavender et al., 2015). With training, ‘novices’ can improve agreement with expert consensus, confidence identifying Behaviour Change Techniques and coding competence, but not inter-coder agreement (Wood et al., 2015).

A recent review of the TDF made some key recommendations that included prioritising two or three key behaviours, and couching these in terms of the *target* behaviour (who does what to whom, when, where and how often?) rather than the *problem* (Atkins et al., 2017). A ‘target behaviour’-approach could be for PNs to weigh and measure children under 5 years when they attend vaccination appointments, rather than a ‘problem behaviour’-approach where PNs ignore childhood overweight. This increases the specificity of the barriers and facilitators and reduces the source of errors commonly made where coded text that refers to *other* behaviours are included in the analysis (Atkins et al., 2017). It is possible that my examination of “Preventive healthcare,” and the various examinations that constituted the HKC, included too many behaviours that incorporated the whole practice team, making it unwieldy. This would explain why I uncovered barriers that took into account almost all of the TDF domains, why this mapped onto seven of the nine Intervention Functions and why I needed to consider such a large proportion of the Behaviour Change Techniques. Nevertheless, the TDF was born out of the need to “flesh-out” the MRC Framework that specifically targets complex (and usually multifaceted) interventions, which is exactly what my application of the TDF yielded.

Our systematic review did not find a connection between theory-use in the design of a child preventive healthcare intervention and its effectiveness. It would be interesting to search the literature to find if there is any evidence that theoretically derived preventive interventions are more effective than interventions derived without theory. A systematic review of 190 interventions to increase physical activity and healthy eating in *adults* reported approximately half applied theory, but found no association between theory use and intervention effectiveness (Prestwich et al., 2014). The authors proposed a number of reasons why their research was at odds with the findings of earlier reviews (Albada, Ausems, Bensing, & van Dulmen, 2009; Glanz & Bishop, 2010) including their quantification of the extent theory was applied (fidelity). The definitive test of the TDF, therefore, will be whether complex interventions designed using the TDF prove to be more effective than either a-theoretical interventions or interventions based on alternative theories.

Recommendations

The barriers uncovered by the research question (which included HKCs as well as preventive health for young children in general) could be revisited to search for alternative solutions that do not require a specific health check. Instead, preventive health assessment and advice could be incorporated into routine consultations with young children, with information gathered and guidance provided over the course of time. Repeated examinations and sequential screening are also requisites of child developmental surveillance. If this option is considered in the context of the current Australian vaccination schedule, this would incorporate six check-points before five years. At each point parents could be asked if they have attended MCHN services, to avoid duplication of services and establish equity in the healthcare system. For children who do not visit the MCHN, “Enhanced Vaccination Visits” could proceed as follows:

At six to eight-weeks, a full ‘head-to-toe baby check’, is already endorsed in Australia and internationally (American Academy of Pediatrics, 2017; Shribman & Billingham, 2009) and linked to the first vaccination point after birth. It incorporates an assessment of the ‘Red reflex’ (ocular health), and several physical examinations. Recommendations at this visit also include an assessment of parents’ mental health [e.g. *Edinburgh Postnatal Depression Scale* (Cox, Holden, & Sagovsky, 1987)], support for breast feeding mothers, family planning and gynaecological health review where required.

Primary immunisations are then boosted during two additional visits, at four and six months. At these time-points, development could be briefly assessed to rule out major neurological deficits like cerebral palsy (see the case study, ‘Jack’, in the introduction). At this age it is possible to re-evaluate vision for structural ocular abnormalities and squints. A record of growth should be made, including measurements of head circumference to exclude genetic syndromes and congenital abnormalities (e.g. congenital rubella).

From 12 months on, structured developmental surveillance, like PEDs, can be routinely employed to elicit parent concerns, and a brief, targeted examination of vision, fine and gross motor (eye-hand coordination and movement), social and ‘speech’ developmental domains, could be made at this immunisation visit. A similar assessment at the 18-month vaccination visit should specifically inquire about speech and language development [several words being the norm (Raising Children Network, 2017)] because failure to speak may be a risk factor for Autism and other ‘milder’ developmental abnormalities that risk being overlooked. At each juncture, health promotion activities could include dietary and lifestyle advice, enquiries about sleep and other behaviours, to support parents.

From this point on, until the preschool vaccinations at the age of 3.5- 4 years, when a modified evidence-informed HKC (Alexander & Mazza, 2010a) could be performed, there are no scheduled immunisations. However, during this interval, children’s social, language and cognitive skills will dramatically develop along trajectories. Given this situation, the additional opportunities presented by frequent episodes of minor illnesses [approximately 83 per cent of children visit an average 3.8 times per year (Bayram et al., 2015)] would have to be utilised for developmental, growth and health progress to be monitored.

For this model to work requires ‘buy in’ from the majority of practitioners because families with young children have a number of sources of healthcare (Alexander et al., 2013b). Shared responsibility without accountability, and a lack of shared health record systems, remain significant impediments to successful integration, and strong advocacy and leadership from professional groups is needed to overcome these barriers. PNs (and GPs) could be upskilled in developmental surveillance (as already discussed) but would require additional support. Block payments to practices, called Practice Incentive Payments (Department of Human Services, 2017), already exist for immunisations and other preventive activities, and these could be extended to recompense the extra resources required to deliver enhanced services.

The narrative obtained from our research implied that early educators could have a role in developmental assessment of children. In Victoria, Preschool Field Officers already provide support for children with additional needs and build capacity with early childhood educators in government funded preschools (Department of Education and Training, 2015). Garvis (2016) explored a partnership model between parents, early educators and MCHNs. This provided health checks to young children attending a single child-care site, and found that collaboration in this familiar environment was supported by all groups. Projects could explore different models of collaboration and could evaluate if they facilitate the early identification of developmentally delayed children.

An alternative method to improve interdisciplinary and collaborative care between GPs and MCHNs could model itself on the success of Mental Health Professional Networks (Mental Health Professional's Network, 2017). Funded by the Australian Government, 'Networks' began in 2009 as 1,200 local, interdisciplinary workshops involving a range of professionals (GPs, psychiatrists, psychologists and social workers) across Australia. The remit to 'build relationships, improve referral pathways, connect practitioners and provide peer support' could be replicated in an "Early Years Professional Network" to include GPs, PNs, MCHNs, psychologists, speech pathologists, occupational therapists, dentists, paediatricians and early childhood educators. The findings from the Stakeholder Group meeting, that strongly endorsed inter-professional communication and integration, would support such collaborations. This would require a significant injection of funds to coordinate and maintain nationally, but could be piloted in a single area to test if it is acceptable to professional groups and feasible.

Each of the recommendations above, it will be noted, relies not only on changing individual behaviours, but requires the support of overarching professional bodies, government commitment and significant financial investment. Therefore, leveraging the Policy Categories, contained in the outer rim of the Behaviour Change Wheel, is ultimately what will define the success, or failure, of preventive healthcare for young children.

Future research – Implementation research, general practice and preventive healthcare for young children

This body of work has already been cited a total of 45 times, which reflects not only the dearth of research that explores the topic of preventive healthcare for young children but also implementation scientists engagement with the TDF and BCW's application. The multifarious world of general practice means that interventions aimed at improving patient service delivery or (intermediary) health outcomes are, necessarily, complex. Implementation research endeavours to bridge the research-practice gap and acknowledges that the recipient of knowledge translation is not an "empty vessel", but rather is "full of prior knowledge, attitudes, beliefs, values and, above all, contextual constraints at any given point in practice time" (Green, 2008). Receptiveness, opinion and uptake of research is impacted by an individual's previous experience. Thus it is essential to involve the end-user in all stages of research development to successfully implement quality improvement in primary care organisations (Janamian, Crossland, & Jackson, 2016). However, for 'co-creation' to work there must be sufficient funding, effective leadership and governance (Janamian et al., 2016), all of which will be challenging, given recent funding withdrawal from primary care research entities (Winzenberg & Gill, 2016). Given this perspective, the fact that GPs (as the 'end-users' of HKCs) were not consulted when the HKC was initially rolled out, perhaps predetermined its poor uptake. Now that it has been removed from the Medicare Benefits Schedule, I need to adjust my research to address this major shift in context around a large component of GP-delivered preventive healthcare. Future research needs to work with GPs, PNs and their representative groups, to ensure a good fit with current practice and yet remain flexible to broader political and social flux.

The 'dots' also 'need to be joined' in future research with families regarding child developmental problems: What factors in the referral pathway increase referral uptake and follow through by parents? Can these ultimately be linked to the developmental outcomes of cohorts of children? Similarly, pathways for overweight and obesity prevention need to be studied and connected back to primary care interventions, with widespread testing before being generally adopted, because the

burden of preventive healthcare without adequate evidence threatens to overwhelm primary care (Russell, 2005; Yarnall, Pollak, Ostbye, Krause, & Michener, 2003). Quality outcome measures in paediatric primary care are, so far, almost non-existent. One study tried to use emergency department attendance rates as proxy measures of poor access to GP care (O'Loughlin et al., 2013). However, whilst access to specialist and urgent-GP care are regarded as important, other researchers have determined that health outcomes are not *dependent* on the quality of the primary healthcare (Gill, Hislop, Mant, & Harnden, 2012) and measures should relate to process rather than health outcomes (Gill et al., 2012), similar to the approach adopted by Mold's (2014) model. Rates of adherence to national antibiotic prescribing guidelines (Bozic & Bajcetic, 2015; de Bie et al., 2016; Pulcini, Lions, Ventelou, & Verger, 2013; Song et al., 2017) are widely accepted process outcome measures used in paediatric primary care, and these need to be built upon.

As I have already discussed (Page 115) further exploration of GPs knowledge and beliefs about preventive child health and “The Early Child Development Story,” would elucidate levels of understanding amongst GPs. A questionnaire sent to a nationally representative sample of practitioners could test our hypothesis that older GPs, who presumably have not been exposed to current teachings regarding the origins of many adult diseases in early life, are going to be less well-informed. Other related fields of research – child social and emotional development and structured developmental screening – could be similarly explored. Trends in the provision of preventive healthcare to young children would be particularly important to follow-up after cessation of HKC-funding.

Overall, I believe that obtaining outcome measures for child preventive health in primary care is fundamental to the success, or failure, of this preventive health movement. For a few years, the time it takes for a child to pass from infancy into formal education, the spotlight swung onto the delivery of child preventive health from general practice. The RACGP-lead in our stakeholder group talked about “The stars beginning to align”, referring to policymakers waking up to the significance of the ‘Early Childhood Story’ and the need to foster a long-term approach. This vision has not been realised.

Instead, despite sustained high prevalence rates of childhood overweight, dental caries, mental health and behavioural problems, GPs will return to managing what is placed in front of them and will not be in a position to consider what lies beyond. The lack of knowledge of the clinical outcomes of preventive health interventions remains a major handicap. Without knowledge of outcomes there is no will to change, and no direction from professional bodies. This demands an urgent call to action, to obtain broadly accepted outcomes, pertinent to primary care and backed by high quality research evidence.

Preparing the intervention for a Randomised Controlled Trial

Since the removal of specific Medicare-rebated Healthy Kids Checks, core elements of the HKC have been targeted for an intervention study, based upon clinical imperatives, the results of the pilot study, and evidence from overseas trials (Alexander et al., 2017). Our intervention will, therefore, target structured developmental screening (using PEDS) and childhood overweight. The intervention proposes teaching, training, equipping and resourcing six general practices according to the pilot study intervention protocol. In place of face-to-face PEDS training, GPs will be provided with access to an accredited online course. Data will assess recording of child- development (in the clinical record) at baseline and 12 months following the intervention – representing the primary outcome measures of the intervention. Secondary outcomes of the documentation of BMI (data extraction), GP and PN knowledge and self-efficacy regarding child development, will be measured using surveys adapted from both US-based research (Lannon et al., 2008) and those used in our pilot study (Alexander et al., 2015a). Provision is also made for a health economic analysis through linkage of data with Medicare and prescribing records. Six control practices will be similarly scrutinised (they will be provided with PEDS training at study conclusion). GPs, PNs and practice managers in the intervention group will be interviewed by phone, at the conclusion of the study, to assess their experiences of the intervention process, its impact on their practice, referral patterns and their perceptions of the outcomes. A subset of consenting parents, who complete a PEDS questionnaire for

children in the intervention group, will undergo semi-structured phone interviews within eight weeks of receipt of a GP visit. These will evaluate: if their expectations of the visit were met, their levels of satisfaction with communication from the GP, changes to usual GP care and outcomes from the consultation regarding follow up or referrals.

This study will implement a complex intervention according to evidence-based implementation science methods, and generate new knowledge regarding the effectiveness of a practice level intervention to lift the delivery of preventive care to young children. It has great potential for improving the health of all Australian children and represents a significant outcome that reflects the National Research Priority goal for ‘a healthy start to life’ (National Health and Medical Research Council, 2014).

Concluding statements

This thesis set out to develop and pilot a contextually-relevant, evidence-based complex intervention that addressed the barriers and enablers identified in initial qualitative research with parents, GPs and PNs, to increase child preventive health in general practice. Through the use of novel implementation science techniques I designed the intervention, established a mode of delivery, and piloted it with a small number of GP practices. A systematic review of the literature of primary care preventive child health interventions ensured that my intervention aligned with previous research and had not omitted any important constituents. Despite the removal of a significant general practice child health assessment, preventive healthcare for young children remains as important as ever in general practice. Developmental vulnerabilities have not disappeared, nor have the imperatives for early intervention. Children, such as Jack, whom I saw in my clinical practice, and parents and practitioners I interviewed, highlighted to me, time and time again, the importance of not allowing children to ‘fall through the cracks’. The difference that timely interventions in early childhood can make to the family’s health and wellbeing, and the long-term developmental-trajectory of the child, is immense. The previous decades have seen substantial advances in the fields of neurodevelopment, child and

subsequent adult health. We need to actively pursue long term preventive health goals to fully capitalise on these revelations, so that successive generations can succeed in overcoming childhood disadvantage, for the long term benefit of all Australia.

My ongoing experiential exposure as a researcher and GP has coalesced in me, a strong commitment to better embed preventative child health in primary care. This is why I have planned to accommodate the inaugural gathering of early childhood professionals in our local area at my own general practice site. This will present the first opportunity to meet, put faces to names, reduce communication barriers, and share our collective knowledge and experience of early childhood. This, I believe, will move the knowledge I have gained through this research process, into an action cycle that can eventually be replicated in areas elsewhere. I would also like to up-scale the intervention in a cluster randomised controlled trial to test the intervention model, initially within Victoria, but ultimately in other jurisdictions where preventive child health and surveillance operate differently.

Finally, although I no longer see Jack regularly (because his family live in a different area) I reflect on his case each time I present it to medical students when I lecture on “preventive health for children”. I also still get regular updates on his progress from hospital specialists. No cause was found for his cerebral palsy. The last letter, a month ago, informed me that his (step-) father had taken him to his last appointment and Jack would be placed on the list for more Botox to treat the spasticity in his legs. ‘Baclofen’ had helped him, especially his articulation and now, aged five, he attends a special school. The family are expecting another child later this year.



**Figure 9. Jack aged two years six months with his mother (with permission)
(Names changed)**

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Appendices:

No.	Title	Description
1	Alexander, K.E., Mazza, D., 2010. The Healthy Kids Check - is it evidence-based? Med J Aust 192:207-10.	PDF attachment of publications relevant to topic, HKC
2	Alexander, K., Mazza, D., 2010. How to perform a 'Healthy Kids Check'. Aust Fam Physician 39:761-5.	PDF attachment of publications relevant to topic, HKC
3	Questionnaire used in parent study	
4	Parents' perceptions of preventive healthcare for young children	Ethics approval notice
5	Focus group guide for GP and practice nurse study	
6	Barriers and enablers of preventative healthcare for young children	Ethics approval notice
7	Report on the Barriers and Enablers of Preventive Healthcare for young children (sent to stakeholder group)	
8	Implementing preventive healthcare for young children in general practice	Ethics approval notice (Pilot study)
9	Examples of Questionnaires used in the Pilot study	
10	Implementation Status Grid (Pilot study)	
11	Equipment Inventory Status (Pilot study)	
12	Practice Resource list provided to clinicians (Pilot study)	
13	Secondary level screens, suggested management and algorithm (Pilot study)	
14	Increasing the Delivery of HKCs-a Case Study Developing a Complex Intervention	Poster - July 2015 Primary Health Care Research Conference, Adelaide
15	Small beginnings: A systematic review of interventions to improve the delivery of preventive healthcare for young children in general practice	Poster- July 2016 Society for Academic Primary Care Conference Dublin
16	Healthy Kids Checks open 'can of worms' for GPs	Media 1, 2 November 2012
17	Kids Checks minus mental health?	Media 2, 7 March 2013
18	GPs can play bigger role in assessing children's fitness for school	Media 3, 23 July 2014
19	Healthy Kids Checks a budget casualty	Media 4, 13 May 2015
20	Q & A: Healthy Kids Check budget cuts	Media 5, 18 May 2015
21	GPs slam end of Healthy Kids Check	Media 6, 20 October 2015
22	Autism care needs team approach	Media 7, 28 July 2017

The Healthy Kids Check — is it evidence-based?

Karyn E Alexander and Danielle Mazza

The Healthy Kids Check (HKC), introduced by the Australian Government into the Enhanced Primary Care Program in July 2008, continues the trend of illness prevention and improved coordination of care through services that attract Medicare Benefits Schedule rebates. It targets every 4-year-old child in Australia for a basic health check before commencing school, to “promote early detection of life-style risk factors, delayed development and illness, and introduce guidance for healthy lifestyles and early intervention strategies”.¹

Medical practitioners and practice nurses can administer the HKC, with a Medicare rebate for the service being contingent on completing the vaccinations for 4-year-olds.² Six areas of health must be examined as part of the HKC (Box 1), some of which contain a number of components. Additional examinations may be completed at the discretion of the practitioner.

We aimed to determine whether the mandatory assessments within the HKC are supported by evidence-based clinical guidelines or systematic reviews.

METHODS

We performed a search of databases and websites (Box 2) for clinical practice guidelines and systematic reviews published between January 2000 and October 2008. Search terms included “child health”, “prevention”, “screening”, and health topics reflecting the mandatory components of the HKC.

1 Healthy Kids Check

- Administered by child's usual general practitioner or designated practice nurse
- Conducted in conjunction with vaccinations for 4-year-olds
- Provide parents with a copy of the *Getset 4 life – habits for healthy kids* guide, an information booklet that includes tips on child health and development
- Checklist of mandatory assessments:
 - Y Measure height and weight
 - Y Check eyesight
 - Y Check hearing
 - Y Check oral health
 - Y Question toilet habits
 - Y Note known or suspected allergies ◆

ABSTRACT

Objective: To assess whether the components of the Healthy Kids Check (HKC), a preschool screening check recently added to the Australian Government's Enhanced Primary Care Program, are supported by evidence-based guidelines or reviews.

Data sources: Guideline and MEDLINE databases were searched for guidelines and systematic reviews published between 2000 and 2008 that were relevant to screening, prevention or well-child care in primary health care, and including children of preschool age. Search subjects reflected the HKC components: growth, weight, obesity, vision, hearing, oral health, enuresis, encopresis, allergic disease and food allergies.

Study selection: 34 relevant guidelines or reviews were retrieved.

Data extraction: For each component of the HKC, guidelines addressing the presumed rationale for screening, or the test or tool required to implement it, were reviewed. Relevant evidence-based and consensus-based guideline recommendations were assessed as either supporting or opposing components of the HKC, or stating that the evidence was insufficient to recommend screening of preschool children.

Data synthesis: Guidelines were often inconsistent in their recommendations. Most of the components of the HKC (eg, screening for chronic otitis media and questioning about toilet habits) are not supported by evidence-based guidelines relevant to the primary care setting, though a number of consensus-based guidelines are supportive.

Conclusions: There is currently a dearth of evidence relevant to child health surveillance in primary care. The components of the HKC could be refined to better reflect evidence-based guidelines that target health monitoring of preschool children.

MJA 2010; 192: 207–210

Guidelines and systematic reviews were included if they were published in English, considered children of preschool age, and were relevant to practitioners in primary care. The topic “immunisation” and guidelines adapted from other primary guideline sources were excluded.

For each component of the HKC, guidelines were extracted if they addressed the presumed rationale for screening or the test or tool required to implement the examination in the primary care setting. Guideline recommendations are often graded to reflect the best available evidence, but the method used for this is not consistent between guideline developers. For the purposes of this review, statements were considered to be “evidence-based” if they incorporated evidence equivalent to National Health and Medical Research Council (NHMRC) level III-3 or above, and “consensus-based” if below this level.³

RESULTS

A total of 29 guidelines and five systematic reviews that contained statements relevant to the mandatory components of the HKC were retrieved.^{4–37} Guideline recommenda-

tions were tabulated according to whether they supported or opposed each HKC

2 Databases and websites publishing guidelines used in this review

Databases

MEDLINE

The Cochrane Library

Websites

Agency for Healthcare Research and Quality (United States)

American Academy of Pediatrics

Australian Government Department of Health and Ageing

Guidelines Advisory Committee (Canada)

Guidelines International Network

Michigan Quality Improvement Consortium

National Health and Medical Research Council

National Institute for Health and Clinical Excellence (United Kingdom)

National Guideline Clearinghouse (US)

New Zealand Guidelines Group

National Institute for Health Research Health Technology Assessment programme (UK)

Scottish Intercollegiate Guidelines Network ◆

assessment (Box 3). Many guidelines identified gaps in the evidence and were unable to make a recommendation either for or against a particular screening examination. One guideline¹⁰ has since been withdrawn, at the end of 2009.

DISCUSSION

The mandatory assessment components of the HKC, although in line with health promotion and disease prevention primary care agendas, do not have a strong evidence base.

Stand-alone measures of height and weight do not confer health benefits for preschool children in screening programs,^{4,5} but are useful when translated into measures of body mass index (BMI) (weight [kg] divided by height squared [m²]). Guidelines consistently indicate that calculating BMI is a practical estimate of childhood overweight and obesity and should be documented on appropriate BMI percentile charts.⁵⁻¹³ The United States Centers for Disease Control and Prevention BMI-for-age percentile charts, which identify children at risk of overweight at a BMI above the 85th percen-

tile (obesity, above 95th percentile), should be used until local BMI growth charts become available.¹² The lack of effective treatment measures means that screening programs for childhood overweight and obesity remain controversial.^{4,5}

Guidelines are contradictory in their recommendations for each component of vision screening. There is no direct evidence that screening for visual impairment, compared with no screening, leads to improved visual acuity.^{14,15} Despite this, preschool screening programs are strongly supported in the US,¹⁶⁻¹⁸ based on indirect evidence

3 Mandatory assessment components of the Healthy Kids Check, with relevant guideline statements

Mandatory assessment	Supporting guideline statements	Opposing guideline statements	Insufficient evidence for screening
Measure height			Screening for short stature ⁴
Measure weight	BMI can identify overweight (EB) ^{5,6,8,14} BMI-for-age percentile charts should be used (CB) ^{7,9-12}	Screening for overweight (EB) ⁴	Screening for overweight ⁵
Conduct a visual inspection of eyes	Screening for amblyopia/strabismus (EB) ^{14,15} (CB) ^{16,18}	Screening for risk factors for amblyopia (EB) ⁴	Impact of screening on prevalence of amblyopia ¹⁹
Check eyesight using LEA Children's Chart or similar	Screening for defects in visual acuity (EB) ^{14,15} (CB) ^{16,18}		Preschool visual acuity screening ⁴
Seek parental concerns about child's vision (eg, squint, infection, injury)	Asking parent about possible eye or vision problems (CB) ¹⁶		No evidence evaluating screening for parental concern ¹⁵
Question if child has family history of eyesight problems	Asking about positive family history of strabismus, amblyopia or media opacity (CB) ¹⁷		No evidence evaluating screening for family history ¹⁵
Check hearing, including conducting an ear examination	Abnormalities of eardrum may indicate hearing impairment (CB) ²¹		Alternative screening tests not adequately compared ²⁰ Inadequate evidence for school entry screening ⁴
Seek parental concerns regarding child's hearing, listening, following instructions, or language	Parental concern is of greater predictive value than examination in doctor's office (EB) ²¹		
Question if child has any history of ear infections, discharge, recurrent or chronic otitis media		Screening for otitis media with effusion (EB) ^{4,24,25}	
Check oral health — teeth and gums		Caries risk assessment should be based in dental practice (EB) ²⁶	Dental health screening or caries risk assessments ^{4,27}
Question if child has been to dentist			Impact of general practitioner referral to dentist ²⁷
Question how often child brushes teeth	Brushing teeth twice daily with fluoride toothpaste (EB) ^{26,29,30}		
Question whether child is independent with toileting		Assess after age 5 years (CB) ³¹⁻³³	
Question whether child wets the bed		Assess after age 5 years (CB) ³¹⁻³³	
Note suspected allergies	Sensitivity to most food allergens remits later in childhood (EB) ³⁵ (CB) ³⁶		
Note known allergies	Educate, prescribe and develop management plan for identified children (CB) ^{34,35}		

BMI = body mass index. EB = evidence-based guideline statement (National Health and Medical Research Council [NHMRC] level III-3 or above³). CB = consensus-based guideline statement (below NHMRC level III-3³).

that screening tests are effective at detecting and allowing treatment for strabismus, amblyopia and refractive error.^{14,15} However, their application in primary care has not been established,¹⁵ and there is insufficient evidence to determine if screening and subsequent treatment reduce the prevalence of amblyopia in older children.¹⁹ Screening for eye infections or injury may only be appropriate in some Indigenous communities in Australia,³⁸ and programs should be tailored accordingly.

How to assess a child's hearing as part of the HKC is unclear, as hearing test options have not been adequately trialled for use in primary care.²⁰ One guideline advocates inspection of the eardrums and direct questioning of the parent about problems with hearing or speech development.²¹ A review of the whispered voice test found it to be reasonably sensitive (80%–96%) and specific (90%–98%) in children, but the testing procedure requires standardisation in the primary care setting.²² In the US and United Kingdom, audiometry is the preferred screening method.^{20,21,23} Pneumatic otoscopy successfully identifies otitis media with effusion, but screening programs for non-Indigenous children are not supported by guidelines.^{4,24,25}

There is currently insufficient evidence to recommend for or against oral health screening in preschool children.⁴ However, the rising prevalence of dental caries in young school-aged children is a major public health concern.³⁹ Evidence-based guidelines do not currently support general practitioners implementing caries risk assessments^{26,27} (clinical evaluation of the teeth and gums for plaque, gingivitis and decayed or missing teeth), and there is debate as to whether they should be trained to do so,²⁸ or if this should be confined to dental practice.²⁶ There is also insufficient evidence that referring children to the dentist and dietary counselling by GPs improves oral health.²⁶ However, guidelines are consistent in recommending assessment of a child's exposure to fluoride in drinking water²⁹ or toothpaste, with good evidence for the benefits of brushing teeth twice daily with fluoride toothpaste.^{26,29,30}

The evidence indicates that screening for problems with toileting at 4 years of age is inappropriate and should be removed from the HKC. Guidelines do not recommend assessment of enuresis until a child is at least 5 years old.^{31–33} A fifth of normal 5-year-olds still experience nocturnal enuresis.⁴⁰ Screening for constipation and encopresis is

not addressed in guidelines, except in association with enuresis.

Identifying children at risk of anaphylaxis and their subsequent management is an important step towards preventing food anaphylactic reactions in schools. This recommendation is derived from a consensus-based guideline,³⁴ and recent Victorian legislation enforces it.⁴¹ Re-evaluating patients with suspected food allergy is also supported by guidelines to avoid unnecessary dietary restrictions, as many nutritionally important food allergies are outgrown.^{35,36} The assessment of other allergies is not addressed by guidelines, other than an evidence-based recommendation that referral to an allergist–immunologist may improve outcomes for children with allergic rhinitis and eczema.³⁷

By filling a gap between maternal and child health nurse screening and examinations of selected children by school nursing services, the HKC has the potential to play a key role in childhood developmental surveillance, whereby professionals work with parents to detect specific problems over the course of time. However, despite the limitations of the search methods we used, the evidence behind the HKC is not compelling and its components are ill defined and lack rationale. The HKC could be refined to better reflect the available evidence. For example, guidelines that discussed fluoride exposure for oral health were based on high levels of evidence, and information on a child's exposure to fluoride should be sought. On the other hand, screening for chronic otitis media and questioning about toilet habits are not supported by evidence and should be removed from the HKC.

Guidelines are also inconsistent in their recommendations. Most of the components of the HKC are not supported by evidence-based guidelines relevant to primary care, though a number of consensus-based guidelines are supportive. Some components of the eyesight check, hearing tests and the use of caries risk-assessment tools have not been validated in the general practice setting.^{15,22,27}

This review attempted to identify guidelines that support the assessment tasks of the HKC. It did not include a formal review of the quality of those guidelines because the subject matter covered by the HKC is so diverse. Guideline quality may also account for inconsistency between recommendations, and further research could incorporate such a review.

Appraisal of guidelines that endorse the non-mandatory components of the HKC and that identify other useful preventive health measures is required. The uptake and utilisation of the HKC, and its perceived usefulness by health care providers and parents, could inform the program as a whole. Longer-term evaluation should ascertain how well parents comply with follow-up recommendations and the program's impact on health outcomes.

ACKNOWLEDGEMENTS

This study was funded by a Department of Health and Ageing Primary Health Care Research, Evaluation and Development (PHCRED) writing grant.

COMPETING INTERESTS

None identified.

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(Received 17 Feb 2009, accepted 12 Oct 2009) □



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How to perform a 'Healthy Kids Check'

Background

The Healthy Kids Check aims to gather health information, identify health problems and promote healthy lifestyles around the time of the 4 years of age vaccinations. It consists of a checklist of examinations and assessments, six of which are mandatory.

Objective

A series of evidence based examinations that fulfil the mandatory requirements for a Healthy Kids Check and which can be applied in general practice are proposed. Consideration is also given to nonmandatory examinations and additional assessments which have some evidence for their application.

Discussion

The proposed examination enables general practitioners to remain positively engaged with families and contribute toward the health surveillance of preschool children. Changes to the Medicare Benefits Schedule, which support time based reimbursement for preventive healthcare may encourage greater uptake of the Healthy Kids Check.

Keywords: guidelines as a topic; health promotion; preventive medicine; paediatrics



information, and is compliant with the mandatory requirements. most of the components of the healthy Kids check are already recommended as preventive activities in general practice² and, where available, evidence based clinical practice guidelines have informed this guide.

Mandatory assessments

Following consent from the parent, begin the healthy Kids check with examinations which are nonthreatening and familiar to most young children. the practice resources required to perform the checks are listed in *Table 2*.

Height and weight

measure the child's height and weight to calculate and plot the body mass index (bmi) on a bmi centile chart.³ A bmi above 85th centile suggests overweight (above 95th centile suggests obesity) and requires later assessment for additional risk factors.⁴ As a measure of thinness, a bmi less than the third centile may also require follow up.⁵

Eyesight

check with the parent for concerns about the child's vision, or a family history of squint. A number of screening tests for amblyopia can be effectively conducted in primary care.^{6,7} test the child's uniocular visual acuity using an age appropriate visual acuity chart, with one eye effectively covered. ensure the child is standing 3 m from the chart and indicate a line of figures to be 'read'. check the eye movements. then, using a pen torch, conduct a 'corneal light reflection' test (hirschberg, *Figure 1, 2*) followed by a 'cover test' (*Table 3*).

Hearing

Ask the parent if they have any concerns about their child's hearing. For a well child it is not

The Healthy Kids Check, introduced in July 2008, aims to gather health information, identify health problems and promote healthy lifestyle around the time of the 4 years of age vaccinations, in preparation for starting school.¹ It can be conducted by the child's usual general practitioner, or delegated to, or combined with an assessment by, the practice nurse.

the healthy Kids check consists of a checklist of examinations and assessments, some of which are mandatory (*Table 1*). in addition, the patient's history needs to be updated, the 4 years of age immunisations completed and a 'Get set 4 life' health promotion booklet given to the family, for a medicare rebate to be claimed.

the authors propose an examination which takes 30 minutes to administer, provides useful

necessary to perform otoscopy, nor is there any evidence that screening for otitis media with effusion in the general Australian paediatric population is beneficial.⁸

Oral health

most GPs have not received training in the assessment of oral health in children. the

'lift the lip' tool (*Figure 3*), developed in new south Wales, is easy to apply.⁹ Request the parent wash their hands and raise the upper lip of their child. using a pen torch, examine the gingival border for plaque, and check the teeth for decayed, missing or filled teeth. emphasise the importance of brushing (assisted by an adult) twice per day with fluoridated toothpaste and promote drinking tap water.

Table 1. Healthy Kids Check

Checklist of mandatory assessments

- Measure height and weight*
- Check eyesight*
- Check hearing*
- Check oral health*
- Question toilet habits
- Note known or suspected allergies

Additional (nonmandatory) assessments to consider

- Discuss eating habits*
- Discuss physical activity*
- Question speech and language development*
- Check fine and gross motor skills*
- Question behaviour and mood*
- Others as necessary, eg. injury prevention (car restraints)*
- Environmental tobacco smoke

Note: Medicare item 10986 for Healthy Kids Check conducted entirely by the practice nurse, and Medicare items 701, 703, 705, 707 (time based health assessments) for Healthy Kids Check requiring GP input

* Also recommended as preventive activity in general practice for children 2–5 years of age in the RACGP 'red book'²

Table 2. Practice resources for a Healthy Kids Check

Mandatory components

- Stadiometer for measuring height
- Balance beam or electronic scales
- BMI calculator and centile charts (www.bcm.edu/cnrc/bodycomp/bmiz2.html)
- Visual acuity charts (eg. Snellen, Lea, Tumbling E, HOTV)
- Eye occluder, pirate's patches or modified wrap-around sunglasses
- Pen torch
- Knowledge of local fluoridation of water supply
- The 'Get Set 4 Life' booklet

Nonmandatory components

- Parents' Evaluation of Development Status questionnaire (www.rch.org.au/ccch/resources.cfm?doc_id=10963)
- The Australian guide to healthy eating (www.health.gov.au)
- Walking school bus lists for regional schools (www.travelsmart.gov.au/schools/schools2.html)
- Pencil and paper with pre-drawn cross for the child to copy
- Eight wooden blocks
- Sleep questionnaire²¹

Toilet habits

While it is desirable for a child who is 4 years of age to be independent using the toilet, questioning for enuresis will raise many false positives. one-fifth of children aged 5 years still wet the bed at night.¹⁰ enuresis, defined as the repeated voiding of urine into bed or clothes at least twice per week for three consecutive months, can be investigated when the child is at least 5 years of age and where distress or concern is expressed.¹¹

Known or suspected allergies

Questioning about food allergies presents an opportunity to discuss any previously identified allergens. obtaining medical information about children at risk is identified as an important first step toward prevention of anaphylaxis in the school environment.¹² if required the GP can prepare a management plan, consider prescribing medication and/or arrange a follow up appointment with a specialist for



Figure 1. Performing a hirschberg test

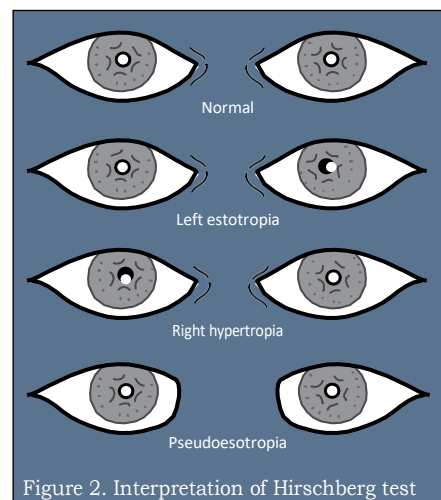


Figure 2. Interpretation of Hirschberg test

Table 3. Examination techniques for assessment of vision**Visual acuity using age appropriate chart**

- Test one eye at a time with nontested eye effectively covered
- Testing distance is 3 m from chart
- Use a line of figures rather than single figures
- A minimum of four out of six correct figures at 6/12 line is normal
- A difference of two lines or more between the eyes should be referred

Check ocular motility

- Ask the child to look at the roof, down at the ground and side-to-side.

Or

- Request for the child to follow a toy or pen torch

Test ocular alignment

- Corneal light reflection (Hirschberg) test: hold a pen torch and distraction toy together 40 cm in front of child's face. To check alignment switch on torch and note the position of the reflected light in the pupils (manifest squint)

And

- Cover test: hold the distraction toy 40 cm in front of the child and cover one eye with an occluder. Uncover the eye and move the occluder to cover the other eye. Any movement of the eye as it is uncovered by the occluder should lead to a referral (latent squint)

Note: A child, 4 years of age, who is unable to cooperate with a component of vision testing should be re-examined within a month and referred after a second unsuccessful examination⁷

this set of examinations completes the mandatory components of the healthy Kids check.

Nonmandatory assessments**Eating habits**

concerns about eating habits are frequently raised by parents. consistent messages from food guides, also promoted in the 'Get set 4 life' booklet, include eating more vegetables, fruit, legumes and whole grains, using less sugar and saturated fats, and promoting plant oils.^{14,15}

Physical activity

health professionals need to promote physical activity at every opportunity. Activity, as part of daily life, can be encouraged by providing information on programs such as the 'walking school bus'.¹⁶ in addition, there is some evidence that limiting inactive screen time to less than 2 hours per day of television, computer, and video games may benefit health in this age group.¹⁷

Advice to sit as a family around the table with the television off as often as possible can also promote healthy eating and less screen time.¹⁸

review before the child commences school. it is worth noting that many early onset food allergies to important food groups (dairy, egg, soy) are outgrown by school age, so specialist review may also allow these foods to be reintroduced.¹³



Figure 1. SA Dental Service 'Lift the Lip' tool. Reproduced with permission

Table 4. Assessing behaviour and development at 4 years of age²³**Behaviour development – questions for the parent****Suggested questions to encourage more in depth discussion**

- How is your child doing at preschool or childcare?
- What questions or concerns do you have about your child? Your child's health? Your child's ability to get along with other people?
- How are things going for your family?
- How are things going for your child?
- What changes or stresses have occurred in your family lately?

Physical development – questions for the child**Assess gross and fine motor activities**

- Can you hop on one foot?
- Can you balance on one foot for 2 seconds?
- Can you build a tower of eight blocks?
- Can you copy a cross?
- Can you draw a person with three parts, eg. body (1), head (1) and legs (1)?
- Can you cut and mash your own food and pour a drink?
- Can you brush your own teeth?
- Can you dress yourself, including buttons?

Cognitive development – questions for the child**Assess understanding**

- Can you name four colours?
- Are you a boy or a girl? (Should be aware of gender of self and others)

Speech and language development

speech by 4 years of age should be clear to others. Questioning for parental concern about a child's speech is equally as effective as applying formal screening instruments in the primary care setting, and is more time and cost efficient.¹⁹ the consultation provides an opportunity to observe how the child engages, and may prompt more formal assessment.

Motor skills, behaviour and mood

Developmental and behavioural problems may coexist. undetected developmental problems may present as behavioural problems,²⁰ and disruptive behaviour may impede a child from attaining social and emotional developmental milestones.²¹ it therefore makes sense to combine behavioural and developmental screening (Table 4). there are many standardised developmental screening tests, and some have been validated for use in primary care.²⁰ less than half of developmental and behavioural health problems are identified before a child begins school, and the use of such 'tools' increases their detection.²⁰

in the setting of a healthy Kids check, the Parents' evaluation of Development status²² questionnaire is a good first line screen of child behaviour and development,^{23,24} and in some practices could be obtained from parents in

the waiting room, making consultation time more efficient. the check list of 10 'open ended' questions can be utilised informally as a prompt for parental concerns, or can be scored and interpreted to obtain a level of risk, with suggested management outcomes.²²

sleep behaviours, often highlighted as a concern for parents, are also more likely to be identified by using questionnaires (eg. beARs – 'bedtime, excessive daytime sleepiness, Awakenings, Regularity, and snoring').²⁵ the prevalence of paediatric sleep problems (25%)²⁶ is surprisingly consistent across all cultures but parental knowledge of healthy sleep varies widely. A chinese belief that a snoring child reflects 'strength' will mean that this is not recognised as a health problem, and information on the child snoring may have to be specifically elicited by the clinician.²⁶

Injury prevention

injury prevention, including the assessment of safety in the car is another matter that may be regarded as important and has some evidence for its application. Recent legislation simplifies the use of child restraints and booster seats in Australia, with the requirements now being based on age, as opposed to being based on weight (Table 5).²⁷ there is insufficient evidence to assess the incremental benefit of counselling

regarding car restraints²⁸ but passenger motor vehicle accidents remain a major cause of death and disability in children.

Environmental tobacco smoke

there is good evidence that exposure to environmental tobacco smoke increases a child's risk of ear and respiratory infections, asthma and meningitis.²⁹ Parents who smoke may not be aware that in a 1 year period, their children will inhale the equivalent of 60–150 cigarettes.²⁹ smoking in cars that have children in them is now illegal in most Australian states and territories, and counselling may benefit the entire family.

Discussion

the healthy Kids check invites young children into the general practice office to be seen on an occasion when they are not sick, to undergo examinations which are relatively enjoyable. this consultation has the potential to reaffirm positive relationships between families and GPs.

the level of evidence behind the components of the healthy Kids check is either not high, or lacking in the primary care setting.³⁰ in addition, health outcomes for young children are more difficult to measure when compared to outcomes for groups such as diabetic patients. nevertheless, opportunities for prevention and promotion of healthy lifestyle, which may impact on the whole family, need to be embraced.

in addition, the prevalence of behavioural health problems, with significant under-recognition by health professionals and the barriers that prevent parents' disclosure, means that opportunities to offer early intervention may be lost without specific countermeasures such as the PeDs questionnaires.³²

time based preventive healthcare reimbursements for GP services, introduced in may 2010,³³ allow for practice nurse and GP evaluations to be combined, and may encourage greater uptake of the healthy Kids check. childhood health surveillance, the repeated application of screening tests by various health professionals, together with clinical assessment and knowledge of family risk factors, inclusive of parental input, can benefit from increased GP involvement. if a practice decides to implement screening and preventive care for young

Table 5. Car travel and young children ³¹
The national age based changes to child restraint and booster seat rules require: <ul style="list-style-type: none">all children up to the age of 7 years to be secured in an approved restraint or booster seat when travelling in vehicleschildren younger than 6 months to be secured in an approved, properly fastened and adjusted, rear facing child restraint, such as an infant capsulechildren from 6 months to younger than 4 years must be secured in an approved, properly fastened and adjusted, rear facing child restraint or a forward facing child restraint with an inbuilt harnesschildren aged 4–7 years must use an approved, properly fastened and adjusted forward facing restraint or an approved booster seat which is properly positioned and fastened New safety laws relating to children up to 7 years of age travelling in vehicles with two or more rows of seats state: <ul style="list-style-type: none">if a car has two or more rows of seats, then children under 4 years of age must not travel in the front seatif all seats, other than the front seats, are being used by children under the age of 7 years, children aged between 4–6 years (inclusive) may travel in the front seat, provided they use an approved restraint or booster, appropriately fitted <p>Note: Implementation dates vary by states and territories</p>

children, the healthy Kids check presents an opportunity for GPs to maintain a stake in this evolving area of health.

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Conflict of interest: none declared.

Acknowledgment

This project has been supported with funding from the Australian Government Department of Health and Ageing under the Primary Health Care Research Evaluation and Development Initiative.

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Appendix 3. Questionnaire used in parent study

Check explanatory statement and receipt of consent forms

I am interested to hear your views about preventive health care for young children.

This might include monitoring

your child's growth and development,

their speech,

hearing and vision,

toilet training,

behaviour,

their emotions and how they get along with others,

their sleep or

eating behaviours.

General demographics

Could you tell me a little bit about you and your family?

- Names and ages of the children?

☐

- Language spoken in the family home?

☐

- Do you have a partner?

☐

Specify which child(ren) are focus of this study if relevant

Health of the child and family

Have you ever been concerned about:- “specify child’s” growth or development?/ behaviour?/ eating behaviours? / your child’s sleep?/ your child’s emotional development?/What about getting along with others?-**What did you do?**

Could you tell me a little about your family’s health in general?

Does “specify child” have any special healthcare needs?

Has “specify child” been sick in the last 12 months? Have there been any hospitalisations?

How able do you feel you are to monitor your child’s growth and development?

Are there any inherited or family conditions which increase your awareness of potential health problems for “specify child”. e.g. squint

Do you feel your experiences monitoring the growth and development of “specify child” are any different compared to your other children

Have you had your child/ren vaccinated?

Where did you chose to go to get your child/ren vaccinated?

Health Services

What services are available to you (in your community) to help you monitor your child’s health, growth and development?

Would you have to make an appointment?

How easy or difficult is it for you to make an appointment to visit the Doctor/Nurse ?

How do you feel about the time it takes to get an appointment?

What preparations do you have to make? Does anyone help out when you have to go?/Do you have to make any special arrangements when you have to attend an appointment?

How would you get there?

How long does it take to get there?

How do you feel about time you have to wait to see the Dr/Nurse?

Health checks and monitoring health

Do you monitor your **own** health and lifestyle factors?

Do you ever **personally** attend your doctor for a check up even when you feel well? What prompts you to do this?

Can you recall any time when you were prompted to make an appointment for a check up **for your child**? What prompted you?

What do you do to keep an eye on your child's growth and development?

Do you ever wish there was someone you could ask about it?

Think back to the last time you had your child weighed/measured? Can you tell me about that?

Have you ever received an invitation for your child to attend a health check?

Have you heard about the Healthy Kids Check?

Has your child had a Healthy Kids Check or a preschool check at the GP surgery?

Have you heard or read anything about Family Tax Benefits and the HKC?

Have you heard about the new social and emotional wellbeing checks that will be introduced at the age of 3 as part of the mental health reform package in the latest budget?

If you **were** invited to go to the GP for a check up for your child, would you go? Why/Why not?

Would you prefer the **practice nurse or your GP** to do the check? Why?

What about health checks with the MCHN?

What makes you choose to visit '*the MCHN*' rather than '*the Dr*'?

How about check-ups with other health professionals? E.g. dentist, optometrist

Is there anything else which helps you monitor your child's health, growth and development?

Do you ever use the internet to do this?

Do you have a Blue book for your child?-How do you use it?

Do you ever discuss issues about **routine healthcare** with your family or friends? Have any of their experiences influenced your decision to take your child for a check up?

Have any **past** experiences shaped how you go about getting health advice for your child?

What about **vaccinations**? Where did you choose to get your child vaccinated?

Visits to the Doctor

Do you have a regular doctor for your child?

Do you to have a number of doctors to choose from?

How important is it for you to be able to see your preferred doctor?

How important is it for you to find a doctor who bulk-bills?

When you attend the doctor for your child, are there any out-of-pocket expenses?

Do you recall if you made a co-payment to the doctor when your child had a HKC?

If a doctor or nurse gave you some advice about your child do you think you would be able to follow through with it?

If a doctor suggested a referral for your child do you ever worry about meeting the cost of that referral?

Do you have any health insurance?

Satisfaction

How satisfied are you with your GP?

How satisfied are you with your maternal child health nurse services?

What do you feel about your GP's handling of children as patients?

What about the MCHN?

What's your impression of the care you have received from doctors in the last few years?

Does your Doctor/Nurse have enough time to discuss all your concerns/ worries/ questions about your child's health

How useful do you find a health check for "**specify child**" with a doctor or nurse?

As part of the background to this study could I ask you:

- The year **you** were born?
- What is the **highest level of education** that you have completed?

Suggested responses:

primary school ☐

some secondary school ☐

completed high school ☐

some additional training (apprenticeship, TAFE courses etc.) ☐

undergraduate university ☐

postgraduate university ☐

- Is your family eligible for **Family Tax Benefit Part A**, the family tax benefit end-of-year supplement?

Yes ☐ No ☐

Is there anything else you would like to tell me about these issues?

How did you find the interview?

Do you have any questions?

Would you suggest to a friend to do this interview?

Thank-you for your time.

We will post you a voucher for \$75 today using a business envelope so it will arrive on the next business day

Check postal address

Human Ethics Certificate of Approval

Date: 8 December 2010

Project Number: CF10/3298 - 2010001718

Project Title: Parents' perceptions of preventive healthcare for young children

Chief Investigator: Assoc Prof Danielle Mazza

Approved: From: 8 December 2010 To: 8 December 2015

Terms of approval

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, and a copy forwarded to MUHREC before any data collection can occur at the specified organisation. **Failure to provide permission letters to MUHREC before data collection commences is in breach of the National Statement on Ethical Conduct in Human Research and the Australian Code for the Responsible Conduct of Research.**
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must contain your project number.
6. **Amendments to the approved project (including changes in personnel):** Requires the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.



Professor Ben Canny
Chair, MUHREC

cc: Dr Karyn Alexander

Appendix 5. Focus group guide for GP and practice nurse study

One Sheet Prompt: Healthy Kids Checks and preventive health for young children

What do you currently do about HKCs?

1) (Knowledge) What do you **know** about the HKC? How do you know about it?

2) (Skills) What components of the HKC are performed? Who does them?

3) (Social/Professional role) What is the **purpose** of the HKC? What do you think about the credibility of the source? Who do you think **should** be doing HKCs? How does this fit with the checks done by MCHNs?

4) (Beliefs about capabilities) How easy or difficult is it to perform the components of the HKC? AND WHY? Do you have the training to do a HKC as it currently stands? What about testing the social and emotional wellbeing of a young child?

5) (Beliefs about consequences) What are the outcomes from doing HKCs?-for the patient and the practice? Do benefits outweigh costs? How will you feel if you *don't* provide this service?

6) (Motivation and goals) Are there incentives to do HKCs? Does the HKC conflict with any guidelines you know about? What motivates you to do a HKC?

7) (Memory, attention and decision processes) Do you remember to recommend a HKC? Do you use any prompts? Do you ever decide not to do a HKC?

8) (Environmental context and resources) What do you think you **need** to conduct a HKC in the practice? Do you have the equipment and resources to help with a HKC? Do you have any systems in place to run HKCs? Is there anything specific about WHERE you practice or the nature of your patient group?

9) (Social influences) Has anyone else or any organisation influenced your decisions to conduct a HKC?

10) (Emotion) Are there any emotions associated with you performing a HKC? How do you feel?

11) (Behavioural regulation) Are there any preparatory steps or procedures required for you to do a HKC? Are there procedures or ways of working that encourage the HKC?

12) (Nature of the behaviours) **Who** needs to do **what** differently to change current practice?

What about the RACGP guidelines –otherwise known as the Red book?

Preventive health-Do you think we have a role? What do you think we should be doing for young children?

Human Ethics Certificate of Approval

Date: 28 February 2011

Project Number: CF10/3289 - 2010001716


Project Title: Barriers and enablers of preventative healthcare for young children

Chief Investigator: Assoc Prof Danielle Mazza

Approved: From: 28 February 2011 to 28 February 2016

Terms of approval

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, and a copy forwarded to MUHREC before any data collection can occur at the specified organisation. **Failure to provide permission letters to MUHREC before data collection commences is in breach of the National Statement on Ethical Conduct in Human Research and the Australian Code for the Responsible Conduct of Research.**
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
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5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must contain your project number.
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9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.


Professor Ben Canny
Chair, MUHREC

Cc: Dr Karyn Alexander;

Appendix 7

Report on the Barriers and Enablers of Preventive Healthcare for young children

Dr Karyn Alexander, Dr Bianca Brijnath, Prof Danielle Mazza

2013

Department of General Practice
School of Primary Health Care
Monash University

SUMMARY

This report presents findings from a study which explored the perceptions of general practitioners (GPs) and general practice nurses (PNs) towards preventive healthcare for preschool aged children. The study used an evidence based methodology which included the Theoretical Domains Framework and Behaviour Change Wheel and focus group discussions (n=6, GPs= 22, PNs = 18). Findings showed that overall practitioners reacted positively towards a role in the provision of preventive healthcare for young children. They conceptualised this service in terms of provision of immunisation services and completing health assessments at the age of 4 years (Healthy Kids Checks-HKCs).

Systematic methods will be applied to the findings (in grey) to make recommendations which aim to change clinical behaviour towards increasing child preventive health services. Provisional recommendations are listed here:

- i. Practitioners expressed uncertainty regarding capabilities and practicalities of delivering HKCs. Practitioners would benefit from education and skills training for HKCs, which should incorporate interpersonal communication skills and tools useful to primary care. Highly respected senior clinicians could model the delivery of individual components, according to the practitioner's professional group, to promote HKCs as being an integral part of the role of PN or GP. Training workshops could be delivered through Medicare Locals or other locally trusted organisations.
- ii. In some cases HKCs have acted as a catalyst for developing the role of PN and expertise amongst some GPs. Practitioners' roles could be targeted to maximise the delivery of HKCs. Training schemes could utilise leaders from within each profession to model a shared role when conducting HKCs. Professional development opportunities could act as an incentive to developing expertise.
- iii. Having a "HKC-champion" in the practice, or a mix of professionals with a common interest in child health and development, promoted delivery of services. Extending opportunities for inter-professional collaboration could further enrich and develop practitioners' expertise and will build capacity in child health promotion, preventive health and child development. Consideration should be given to the formation of local networks of professionals from different disciplines in child healthcare and development. Medicare Locals could play a significant role in developing local partnerships.
- iv. Standardisation of HKCs was linked to confidence in the outcomes and these in turn had a significant impact upon practitioners' beliefs about HKCs. To enhance practitioner confidence in HKCs requires the development of guidelines, dissemination of evidence based tools, and promotion of schemes which secure outcomes for children. Training workshops could also include information about the benefits and evidence for early intervention and decision making tools.
- v. There are key connections between immunisation services and delivery of HKC. Regulations and fiscal policies which link HKCs to immunisation services, and parental tax incentives, reinforce demand for services and need to be upheld. Further promotion and marketing of HKCs and vaccination services delivered through general practice could be considered
- vi. Having systems in place and a supportive physical environment promoted delivery of HKCs. Systems and environmental props which support HKCs could be enhanced. IT tools which prompt appointments for HKCs and community resources could be developed. Financial support for screening tools and equipment, practice development grants or practice incentive schemes could be established to promote the delivery of preventive healthcare for young children.

We have shown that although there are considerable barriers to delivery of preventive healthcare and HKCs, a number of interventions could be considered. In the next phase of the study a group of stakeholders will apply the findings to a systematic framework so that recommendations can be made towards developing an intervention designed to overcome the barriers. The final procedure will be trialled in two general practices following stakeholder consideration.

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EXECUTIVE SUMMARY

The aim of this report is to determine the barriers and enablers to preventive healthcare for young children so that recommendations can be made which will promote its delivery in general practice.

This paper reports the findings from qualitative research with general practitioners (GPs) and general practice nurses (PNs) when they were asked what they thought about preventive healthcare for preschool aged children.

Background

Australia has a universal child health surveillance system which operates through local government. Although services vary across the States their uptake diminishes after infancy, so that developmental problems risk being missed in the preschool years. To counteract this, “The Healthy Kids Check” (HKC), a one-off health check aimed at preschool children, was introduced into general practice in 2008. Administered by PNs and GPs, the HKC comprises a series of assessments testing growth and development, and offers opportunities for health promotion. For reasons which are unclear, uptake of the HKC has been much lower than anticipated and there is a wide variation between the States, yet “Prevention” is now a key aspect of the Australian Government’s plan for health, with a life-course approach beginning before birth.

Objectives

The objectives of the study were to:

- Report the experiences of practitioners in general practice who offer preventive healthcare to pre-school children, including HKCs
- Understand how and why some practitioners readily incorporate HKCs into routine general practice and others do not
- Determine the barriers and enablers to preventive healthcare for pre-school children
- Formulate a guide to overcome difficulties and promote the uptake and delivery of preventive healthcare for young children.

Method

The study was carefully detailed using evidence based methods, to ensure quality within the data. It incorporated:

- A background framework established by the Medical Research Council (UK) to develop and understand complex interventions
- Focus group discussions based on a framework of themes grounded in psychological theory and analysis of data based on the same “Theoretical Domains Framework” (TDF)
- Extended analysis using a simple, but effective, behavioural change model, where behaviour (B) is the interaction between three necessary conditions: Capability; Opportunity and Motivation (COM-B)

- Recommendations formulated using the “Behaviour Change Wheel” (BCW) a system which places the COM-B model central to a suite of interventions categorised according to whether they are directed towards the individual or at policy levels

Findings

The study found that overall practitioners reacted positively towards a role providing preventive healthcare to young children. They conceptualised this service in terms of immunisation services and Healthy Kids Checks and to a lesser extent, opportunistic developmental assessments during “sick-child” consultations.

The principal findings can be summarised as:

- i. Practitioners expressed uncertainty regarding capabilities and practicalities of delivering HKCs
- ii. In some cases HKCs have acted as a catalyst for developing the role of PN and expertise amongst some GPs
- iii. Having a “HKC-champion” in the practice, or a network of professionals with a common interest in child health and development, promoted delivery of preventive services
- iv. Standardisation of HKCs were linked to confidence in the outcomes and these in turn had a significant impact upon practitioners’ beliefs about HKCs
- v. There are key connections between immunisation services and delivery of HKC
- vi. Having systems in place and a supportive physical environment promoted delivery of HKCs

Provisional recommendations towards developing an intervention

Based on the findings and utilising an evidence based framework, a series of provisional recommendations have been developed to inform the development of an intervention to increase the uptake and delivery of preventive healthcare for young children. Each recommendation is based on the principal findings obtained from the study (above) and is supported by the interventions that constitute the Behaviour Change Wheel.

- vii. Practitioners would benefit from education and skills training for HKCs, which should incorporate interpersonal communication skills and tools useful to primary care. Highly respected senior clinicians could model the delivery of individual components, according to the practitioner’s professional group, to promote HKCs as being an integral part of the role of PN or GP. Training workshops could be delivered through Medicare Locals or other locally trusted organisations.
- viii. Practitioners’ roles could be targeted to maximise the delivery of HKCs. Training schemes could utilise leaders from within each profession to model a shared role when conducting HKCs. Professional development opportunities could act as an incentive to developing expertise.
- ix. Extending opportunities for inter-professional collaboration could further enrich and develop practitioners’ expertise and will build capacity in child health promotion, preventive health and child development. Consideration should be given to the formation of local networks of professionals from different disciplines in child healthcare and development. Medicare Locals could play a significant role in developing local partnerships.

- x. To enhance practitioner confidence in HKCs requires the development of guidelines, dissemination of evidence based tools, and promotion of schemes which secure outcomes for children. Training workshops could also include information about the benefits and evidence for early intervention and decision making tools.
- xi. Regulations and fiscal policies which link HKCs to immunisation services, and parental tax incentives, reinforce demand for services and need to be upheld. Further promotion and marketing of HKCs and vaccination services delivered through general practice could be considered
- xii. Systems and environmental props which support HKCs could be enhanced. IT tools which prompt appointments for HKCs and community resources could be developed. Financial support for screening tools and equipment, practice development grants or practice incentive schemes could be established to promote the delivery of preventive healthcare for young children.

Conclusions

Using an evidence based methodology we have shown that the barriers to delivery of preventive healthcare and HKCs are considerable. In the next phase of the study a group of stakeholders will apply the findings to a systematic framework so that recommendations can be made towards developing an intervention designed to overcome those barriers. It is likely that an intervention will be composed of more than one facilitator, and a pragmatic approach needs to be taken to ensure the ‘recipe for change’ contains the correct ‘measures’ and ‘timing’, as well as the right ‘ingredients’. The final procedure will be trialled in two general practices following stakeholder consideration.

FULL REPORT AVAILABLE ON REQUEST

Human Ethics Certificate of Approval

This is to certify that the project below was considered by the Monash University Human Research Ethics Committee. The Committee was satisfied that the proposal meets the requirements of the *National Statement on Ethical Conduct in Human Research* and has granted approval.

Project Number: CF13/2320 - 2013001222

Project Title: Implementing preventive healthcare for young children in general practice

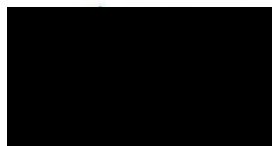
Chief Investigator: Prof Danielle Mazza

Approved: From: 9 October 2013

To: 9 October 2018

Terms of approval - Failure to comply with the terms below is in breach of your approval and the Australian Code for the Responsible Conduct of Research.

1. The Chief investigator is responsible for ensuring that permission letters are obtained, if relevant, before any data collection can occur at the specified organisation.
2. Approval is only valid whilst you hold a position at Monash University.
3. It is the responsibility of the Chief Investigator to ensure that all investigators are aware of the terms of approval and to ensure the project is conducted as approved by MUHREC.
4. You should notify MUHREC immediately of any serious or unexpected adverse effects on participants or unforeseen events affecting the ethical acceptability of the project.
5. The Explanatory Statement must be on Monash University letterhead and the Monash University complaints clause must include your project number.
6. **Amendments to the approved project (including changes in personnel):** Require the submission of a Request for Amendment form to MUHREC and must not begin without written approval from MUHREC. Substantial variations may require a new application.
7. **Future correspondence:** Please quote the project number and project title above in any further correspondence.
8. **Annual reports:** Continued approval of this project is dependent on the submission of an Annual Report. This is determined by the date of your letter of approval.
9. **Final report:** A Final Report should be provided at the conclusion of the project. MUHREC should be notified if the project is discontinued before the expected date of completion.
10. **Monitoring:** Projects may be subject to an audit or any other form of monitoring by MUHREC at any time.
11. **Retention and storage of data:** The Chief Investigator is responsible for the storage and retention of original data pertaining to a project for a minimum period of five years.



Professor Nip Thomson
Chair, MUHREC

cc: Dr Karyn Alexander, Dr Bianca Brijnath

Appendix 9. EXAMPLES of Questionnaires used in Pilot study

Pre-study Questionnaire for Non-clinical staff

Implementing preventive healthcare for young children in general practice

PLEASE PLACE THE COMPLETED SURVEY IN THE ENVELOPE PROVIDED. DO NOT POST. (This will be collected by the Project Officer)

No. _ _ _ / _ _

Section 1.

Please state how much you agree with the following statements:

Statement	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1. I believe Early Intervention services are important in improving outcomes for children and families	1	2	3	4	5
2. Our practice plays a significant role in providing vaccination <i>services</i> to children	1	2	3	4	5
3. I play a significant role in providing advice to parents about vaccination services	1	2	3	4	5
4. I am confident in my ability to talk to parents about Healthy Kids Checks	1	2	3	4	5
5. I am confident in my ability to operate a “recall and reminder” system for patients at this practice	1	2	3	4	5
6. I play a significant role in patient care at this practice	1	2	3	4	5

Section 2. Job Satisfaction Questionnaire (Warr, Cook, Wall, 1979)

Using the following scale, please rate the degree to which you are satisfied with the:

Level of satisfaction	1 least	2	3	4	5	6	7 most
7. Physical working conditions	1	2	3	4	5	6	7
8. Freedom to choose your own method of working	1	2	3	4	5	6	7
9. Your interpersonal relationship with colleagues and fellow workers	1	2	3	4	5	6	7
10. Recognition you get for good work	1	2	3	4	5	6	7
11. Amount of responsibility you are given	1	2	3	4	5	6	7
12. Your remuneration	1	2	3	4	5	6	7
13. Opportunity to use your abilities	1	2	3	4	5	6	7
14. Your hours of work	1	2	3	4	5	6	7
15. Amount of variety in your job	1	2	3	4	5	6	7
16. Taking everything into consideration, how do you feel about your job?	1	2	3	4	5	6	7

(continued over)

No. ___ / ___

Section 3.

Using the following scale, please rate the degree to which you agree or disagree with each statement

I am doing this study because I believe:

Statement	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
1. This practice should have a standardised method of doing Healthy Kids Checks (HKCs)	1	2	3	4	5
2. I will develop my personal skills working with young children and their families	1	2	3	4	5
3. This practice needs to increase revenue generated from HKCs	1	2	3	4	5
4. (Another reason -please state)	1	2	3	4	5

Section 4. Demographics

Please mark the appropriate response

What is your position in the practice?	Practice manager	Receptionist	Other

THANK-YOU for completing this questionnaire

(Continued)

Post-study Clinician Questionnaire

Implementing preventive healthcare for young children in general practice

NAME.....

Section 1.

Please state how much you agree with the following statements

Statement	Strongly Disagree	Disagree	No opinion	Agree	Strongly Agree
1. I believe Early Intervention services are important in improving outcomes for children and families	1	2	3	4	5
2. I play a significant role in providing advice about vaccinations	1	2	3	4	5
3. I think it is important to advise patients about healthy lifestyles	1	2	3	4	5
4. I play a significant role screening for hypertension in adult patients	1	2	3	4	5
5. I think it is important to screen for chlamydia in adults aged less than 29 years	1	2	3	4	5
6. I think it is important to calculate a BMI for my adult patients	1	2	3	4	5
7. I think it is important to calculate a BMI for school aged children	1	2	3	4	5
8. I think it is important to calculate a BMI for children aged 2 to 5 years	1	2	3	4	5
9. I feel confident in my ability to conduct post natal checks of infants (6 week head to toe check)	1	2	3	4	5
10. I feel confident in my ability to perform health assessments of adults aged over 75	1	2	3	4	5
11. I feel confident in my ability to perform health assessments of adults aged 40-49 years	1	2	3	4	5
12. I feel confident in my ability to perform a Healthy Kids Check for a child aged 4.5 years	1	2	3	4	5
13. I feel confident in my ability to perform a Healthy Kids Check for a child aged 3.5 years	1	2	3	4	5
14. I believe pre-school children should have their development assessed in general practice at every opportunity	1	2	3	4	5
15. I feel confident in my ability to detect developmental problems in pre-school children without the use of standardised developmental screening tests (e.g.–PEDS)	1	2	3	4	5
16. I feel confident in my ability to use standardised developmental screening tests (e.g.–PEDS) to help detect developmental problems in children < 5 y	1	2	3	4	5
17. I feel confident in my ability to detect the “red flags” for Autism in children under 5 years	1	2	3	4	5

PEDs = Parents Evaluation of Developmental Status questionnaire

(continued over)

Section 2.

Using the following scale, please rate the degree to which you agree or disagree with each statement

Following this study I believe

Statement	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
18. This practice has successfully implemented a standardised method of doing Healthy Kids Checks (HKCs)	1	2	3	4	5
19. This practice has easily adapted to taking on new tasks and roles	1	2	3	4	5
20. I have developed my professional skills working with young children	1	2	3	4	5
21. This practice has suffered from unforeseen adverse circumstances in recent weeks	1	2	3	4	5
22. This practice has increased revenue generated from HKCs	1	2	3	4	5

Section 3.

For the duration of the study, did you access the list of resources provided?

Resources	Not at all	Yes, once or twice	Yes, > 2 times but less than 6	Yes, > than 6 times
23. Secondary screens e.g. M-CHAT				
24. Parent tip sheets				
25. Referral pathways				

Please use this space to make any comments about this study

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THANK-YOU for completing this questionnaire

Appendix 10. Implementation Status Grid (Pilot Study)

Preventive Healthcare for Young Children (aged 3 ½ - 5 years) Implementation Status Grid

For each of the components please indicate the extent to which your practice has worked on each component. Please check only one box for each component.

Categories of activity include

AP: Already in Place (before this project began)

PT: Planning to Try (it out)

T: Trying/ Testing

BI: Begun Implementation on a Pilot Basis

CI: Completed Pilot Implementation, using routinely

Component of Preventive Healthcare	AP	PT	T	BI	CI
Equipment Our practice has all essential equipment in place for health assessments of young children (Healthy Kids Checks)					
Healthy Kids Checks (HKCs) Our practice routinely conducts health assessments on children between the age of 3 ½ and 5 years					
Standardised Developmental Screening Our practice routinely uses Parents Evaluation of Developmental Status (PEDS) questionnaires (or other standardised developmental screening) for children aged 3 ½ - 5 years undergoing HKCs					
Calculating and documenting BMI Our practice routinely documents measurements of body mass index for children aged 3 ½ - 5 years undergoing HKCs					
Developing a recall and reminder system Our practice has a system for recalling and reminding families about appointments for Healthy Kids Checks					
Maintain a list of Paediatricians to refer to Our practice maintains a list of paediatricians which is easily accessed by all relevant staff members					
Maintain a list of practitioners/ early intervention services, other than paediatricians Our practice maintains a list of commonly used practitioners and early intervention services for families with young children which is easily accessible to all practitioners					
Maintain a list of Community Resources Our practice maintains a list of commonly used community resources for families with young children which is easily accessible to all practitioners					

Appendix 11.

EQUIPMENT Inventory Status (Pilot Study)

Please indicate by marking a tick in the correct box, if your practice has the following equipment in place. **Please check only one box for each component.**

Categories of activity include

AP: Already in Place

OO: On order

PO: Planning to Obtain

No: Not planning to obtain this

EQUIPMENT COMPONENT	AP	OO	PO	No
Digital or balance beam scales Suitable for weighing young children > 2 years (measures to 0.1kg), placed on hard floor.				
Mechanical scales used to measure a child's weight Should be placed on hard (uncarpeted) floor				
Wall mounted stadiometer (see images) Used for measuring height, this stadiometer raises from the floor and is fixed to the wall along its length. Should be placed on firm floor				
Fixed foot and head board stadiometer Used for measuring height, this stadiometer has a foot board to stand on connected along its length to a head board that descends to touch the head				
Tape style stadiometer Used for measuring height, this stadiometer drops down from a wall mount using a retractable measuring tape Should be placed on firm floor				
A ruled measure, stuck to the wall which is used to measure a child's height				
Eye chart e.g. LEA (see images) Suitable for measuring visual acuity in children aged 3 ½ -5 years (Not letters)				
A method to patch the eyes Suitable for covering one eye at a time when testing visual acuity in children aged 3 ½ -5 years				
3 m of floor space between the eye chart and the position of the child for testing visual acuity				
A Body Mass Index calculator Electronic format embedded into medical software				
A Body Mass Index calculator Not embedded into medical software (please state what is used)				

Appendix 12. Practice resources

Name of resource	Adapted from: source	Used for:
Letter: To Parent regarding outcome of HKC	www.pedstest.com	Conveying written results and recommendations following a HKC e.g. concern regarding hearing > attend for hearing test
Letter: New Policy on Child Development and Behavioural assessment in Our Practice	www.pedstest.com	Explanatory note regarding “What parents need to know” about a new practice policy that implements developmental and behavioural assessment including the HKC
Letter: Invitation for child to attend for HKC	-	Invitation to attend preschool vaccination appointment (if required) with HKC and links to Family Tax benefit Part A supplement
Letter: Referral letter to specialist or other health provider	www.pedstest.com	Pro forma letter with tick box option for area of concern detected following HKC and suggested course of action
AEDI results for City of Greater Dandenong	AEDI Community Profile 2012 (now AEDC) from website	Summary results for each community in the City compared to Victoria. Used as motivation and to inform study participants (also supplied to HKC Champion)
Autism Plus Eastern Directory	Autism Plus	Directory of services that may assist in obtaining a diagnosis and managing children with an ASD
Research Nurse: Power point scripts	-	To be used with Power Point presentations with clinicians and non-clinicians
Research Nurse: The argument <i>for/against</i> HKCs	-	1 page reminder regarding possible barriers practitioners might raise against HKCs and how to counteract
Research Nurse: The argument <i>for</i> developmental surveillance	-	2 page discussion sheet regarding possible barriers practitioners might raise against developmental surveillance
Research Nurse: Prevalence estimates	-	1 page re HKC examination and problem prevalence estimates (various sources)
Research Nurse: Setting Goals and Action Planning	-	1 page prompt re setting goals with practice staff
Research Nurse: The Early Childhood Story	Frameworks Institute	1 page to use as motivator with power point presentation
Research Nurse: About Overweight, obesity and BMI	-	Explanation re prevalence and significance of overweight
Research Nurse: Discussion re BMI for children	Community Pædiatric Review	Explanation and diagram re correct measurement of children
Research Nurse: Types of stadiometer	Community Pædiatric Review	Images of different types of height measures for children
Research Nurse: PEDS Brief Administration and Scoring Guide	PEDS at Royal Children’s Hospital Community Child Health	As described: gives facts about developmental delay in children and how to administer, score and interpret results
Research Nurse: PEDS Pearls and Pitfalls	PEDS at Royal Children’s Hospital Community Child Health	Pitfalls administering PEDS guide

Research Nurse: Vision screening	Government of Western Australia Community Health Manual	Vision acuity using Lea Symbols
Research Nurse: Assessing the accuracy of vision testing in a clinic	-	Advisory regarding how to assess a visual acuity chart and “set-up” to test vision
Research Nurse: Lift the Lip guide	Northern Territory Government	Guide to lift the lip and how to check for tooth decay
Research Nurse: Learning speech	Speech Pathology Australia	Guide to development of speech in child
Research Nurse: Healthy Eating/Physical activity	Australian Government Department of Health and Ageing	Healthy Eating and Physical Activity for Early Childhood- includes role for adults re eating behaviours, fussy eating and positive eating practices
Research Nurse: How much is a serve of:	NHMRC dietary guidelines	Advisory sheets re. correct serves of meat, milk/dairy, grain, fruit, vegetables
Research Nurse: Child Temperament	Michigan State University Board of Trustees. The Infant Feeding Series	Background reading re child temperament and parent response
Tip sheet for staff: What to say when...	www.pedstest.com	Tips for reception and clinical staff e.g. when asking a parent to complete a PEDS screening questionnaire; when a child “fails” a PEDS check; when a child “passes” a PEDS or developmental check
Advisory for clinicians: How to perform a HKC	Australian Family Physician	Clinical guide: Alexander K, Mazza D. How to perform a 'Healthy Kids Check'. <i>Aust Fam Physician</i> . Oct 2010;39(10):761-765.
Advisory for clinicians: Problem behaviour in children	Australian Family Physician	Clinical guide: Luangrath A, Hiscock H. Problem behaviour in children--an approach for general practice. <i>Aust Fam Physician</i> . Sep 2011;40(9):678-681.
Advisory for clinicians: Behaviour Management Strategies	Autism Victoria (Amaze)	Information sheet: Behaviour strategies for children with an ASD and other children
Advisory for clinicians: Is my child normal?	Australian Family Physician	Clinical guide: Oberklaid F, Drever K. Is my child normal? Milestones and red flags for referral. <i>Aust Fam Physician</i> . Sep 2011;40(9):666
Advisory for clinicians: Evaluating squints in children	Australian Family Physician	Clinical guide: O'Dowd C. Evaluating squints in children. <i>Aust Fam Physician</i> . Dec 2013;42(12):872-874.
Advisory for clinicians: Managing problems identified during HKC-Suggestions	-	Tip sheet to be used with folder for referral pathways listing options
Advisory for clinicians: List of secondary screens	-	Table listing available secondary screens and summary information
Advisory for clinicians: Algorithm for PEDS pathways and secondary screening	-	Simplifies PEDS referral pathways to be used with secondary screens

Advisory for clinicians: Secondary screening questionnaires suggested for use by GPs	Multiple public sources	e.g. M-Chat for screening for Autism; Pictorial Pediatric Symptom Checklist for screening social and emotional problems with scoring
Advisory for clinicians: Pediatric decision support chart	Maine Youth Overweight Collaborative	Decision support tool –flipchart-developed for American Academy of Pediatrics following 5210 health messages
Advisory for clinicians: Community Health Service	Southern Health	Child and Family program Greater Dandenong
Advisory for clinicians: Child Health Teams	Southeast early childhood development project	Community Health Service Child Health Teams- how to refer
Advisory for clinicians: Developmental Delay and Disability Support	Southeast early childhood development project	Tip sheet Mild-Moderate- Severe support services for child with disability
Advisory for clinicians: Early Childhood intervention service central intake	Southeast early childhood development project	ECIS- how to refer
Advisory for clinicians: Services directory	City of Greater Dandenong	Family and Children's Services
Advisory for clinicians: Lists of services	-	Audiology; Optometrists; Psychologists; Speech therapists;
Advisory for clinicians: Websites and Referral contacts for practitioners	-	Lists all resources with websites and email addresses
HKC Champion: Developmental checklists	Center for Disease Control and Prevention	Lists milestones for age 3, 4, 5 years according to developmental domains
HKC Champion: The Red Flags	https://www.health.qld.gov.au/cq/child-development/	One-page guide to red flag guidelines according to age of child to detect developmental delays
HKC Champion: Tip sheets physical activity	www.goforyourlife.vic.gov.au/kids	Physical activity for CALD communities
HKC Champion: Tip sheets physical activity	Department of Health and Ageing	Guidelines and 'Get up and grow' tip sheets for active play, movement, outdoor play and reduced screen time
Parent tip sheet: Weight	Westmead hospital resource	Weight management tips for parents
Parent tip sheet: Weight	Westmead hospital resource	A healthy lifestyle for a healthy weight
Parent tip sheet: Sleep and Weight	Westmead hospital resource	Link between sleep and weight explained for parents
Parent tip sheet: Lifestyle	www.growuphealthy.org	5-2-1 almost none health messages regarding eating fruits and vegetables , screen time, physical activity, sugary drinks
Parent tip sheet: Physical activity	Australian Government Department of Health and Ageing	Move and play everyday brochure
Parent tip sheet: Bedwetting	Sleep Health Foundation	Nocturnal enuresis explained
Parent tip sheet: Sleep	Sleep Health Foundation	Sleep needs across the lifespan
Parent tip sheet: Sleep	Sleep Health Foundation	Sleep tips for children
Parent tip sheet: Sleep	Westmead hospital resource	Fact sheet: Normal sleep patterns 0-16 years
Parent tip sheet: Bedwetting	Westmead hospital resource	Fact sheet: Nocturnal enuresis explained

Parent tip sheet: Sleep	Westmead hospital resource	Fact sheet: Nightmares and night terrors
Parent tip sheet: Reward/ Behaviour chart	Free Printable Behavior Charts	As described
Parent tip sheet: Physical activity	Westmead hospital resource	Fact sheet: How to get the kids to be more active
Parent tip sheet: Social and emotional health	Westmead hospital resource	Fact sheet: Disruptive disorders in children
Parent tip sheet: Social and emotional health	Westmead hospital resource	Fact sheet: Depression in children
Parent tip sheet: Social and emotional health	Westmead hospital resource	Fact sheet: Anxiety in children
Parent tip sheet: Behaviour	Raising Children website	Consequences (as a management of behaviours)
Parent tip sheet: Behaviour	Raising Children website	Practical advice about discipline
Parent information brochure: What Parents Can Do Right Now to Reduce Aggressive Behavior .	2010-AAP - Developmental and Behavioral Pediatrics Newsletter	By Edward Christophersen, PhD, ABPP and Susan VanScoyoc, PhD, ABPP
Parent tip sheet: Top Ten Tips for Parenting ADHD and Spirited Kids from <i>The Gift of ADHD</i>	www.freeprintablebehaviorcharts.com	Parenting a child with ADHD
Parent tip sheet: Caring for your child's teeth	Westmead hospital resource	Tip sheet regarding tooth decay and cleaning teeth
Parent tip sheet: Picky Eaters-7 Ways To Get Your Child To Eat	www.freeprintablebehaviorcharts.com/parenting_picky_eaters.htm	Tip sheet, picky eaters
Parent tip sheet: Toddler's Mealtime - Tips for The Picky Eater	www.freeprintablebehaviorcharts.com/parenting_picky_eaters.htm	Tip sheet, picky eaters toddlers
Parent tip sheet: Literacy early words	www.earlywords.info	Tip sheets re literacy reading and language at 3 and 4
Parent tip sheet: Literacy and reading	www.letsread.com.au	Tip sheets re literacy and reading
Web sites for tip sheets to email to parents	-	-

Appendix 13. Second level screens, suggested management and algorithm

Choose a second level screen depending on the domain of development that is most at risk (and causing concern for the parent)

Many screening tests have been calibrated for a specific age ranges which may not include the age of the child you are screening. This may affect test validity but should be interpreted with a degree of common sense and is still likely to be more accurate than clinical impression alone.

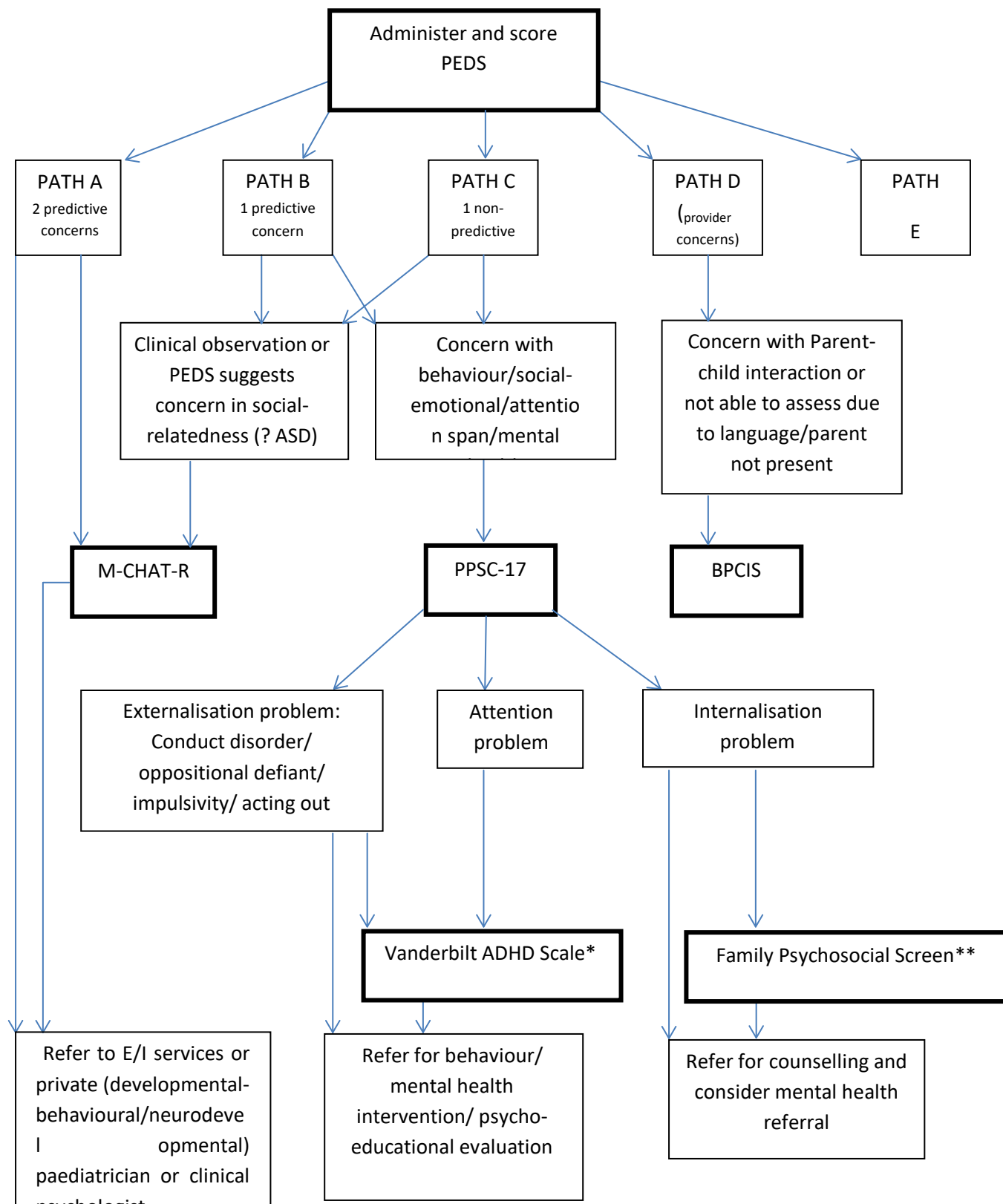
Screening test	Abbreviation	Developmental domain	Number of items	Notes
Modified Checklist of Autism in Toddlers-Revised (Robins et al, 2001)	M-CHAT-R	Autism Spectrum Disorders (ASD)	20 item measure	The M-CHAT-R is an autism screening tool designed to identify children 16 to 30 months of age who should receive a more thorough assessment for possible early signs ASD or developmental delay. Where a problem is identified a follow up interview is required available from http://www.autismspeaks.org/sites/default/files/docs/sciencedocs/m-chat/m-chat-r_f.pdf?v=1 An automated version is available http://www.autismspeaks.org/what-autism/diagnosis/mchat
The Pictorial Pediatric Symptom Checklist-17 (Jellinek et al, 1986)	PPSC-17	Psycho-social disorders, emotional and behavioural disorders	17-item measure is a briefer version of original 35 item measure	In addition to the original 35-item parent report form of the PSC, there are now many other validated forms including translations of the original form into more than a dozen other languages, a youth self-report, a pictorial version, and a briefer 17 item version for both the parent and youth forms. Age 4-5 score > 24 is predictive Age 6> score > 28 is predictive Online version available (automatically scores) http://www.massgeneral.org/psychiatry/services/psc_online.aspx
Brigance Parent-Child Interaction Scale (Glascoe 2002)	BPCIS	Assess strengths and weaknesses in parent-child interaction	18 item tool	Obtained by professional observation or parent self-report. Is a means of observing and rating caregiver-child interaction for the purpose of assessing a dyad's strengths and areas needing improvement. Valid to 36 months.
Vanderbilt ADHD Parent Rating Scale (Wolraich et al, 1998)	VADPRS	To screen for symptoms of ADHD	55 item- parent version VADTRS = 43 item- teacher version	A parent- informant version and teacher version assess symptoms and impairment of performance at home , in school , and in social settings. It reviews symptoms of ADHD according to the DSM-IV criteria. It also screens for co-existing conditions such as <u>conduct disorder</u> , oppositional-defiant disorder, <u>anxiety</u> and <u>depression</u> , and more.
The Family Psychosocial Screen (Kemper and Kelleher, 1996)	FPS	Screen for parental depression, substance abuse, domestic violence etc		Note includes some sensitive questions which you could choose to remove. Family psychosocial issues can range from social needs (e.g., food insecurity, housing instability) to parent psychosocial problems (e.g., depression, intimate partner violence). These impact on child development and are cumulative and influenced by the age and developmental stage of the child

Managing problems identified during HKC-Suggestions

Where a delay in development is identified please read this in conjunction with “Dandenong Disabilities Pathways Tool” in FOLDER marked Referral Pathways

1. Use parent tip sheets (suggested tips are in FOLDER named ‘Parent tip sheets’)
2. Direct parent to appropriate websites (suggested websites are in FOLDER named ‘Referral Pathways’ under ‘List of Websites and Contacts’ and in FOLDER named ‘Parent tip sheets’ listed as “Tip sheets and Web based Resources to email to parents”)
3. Can community family resources be used for support (in FOLDER named ‘Referral Pathways’ see brochure Family and Community Services Directory and ‘List of Websites and Contacts’)
4. Identify domain of concern and send parent home with secondary screening tool and make review appointment with GP (suggested secondary screens are in ‘GP management pathways’ folder)
5. Make review appointment with GP . Clinical review can include review of family history, social history, past medical health issues, current health concerns, and medical examination of child including skin for neuro-cutaneous conditions and CNS examination.
6. Consider obtaining audiology and ophthalmology examinations as part of a general work-up (both listed in FOLDER named ‘Referral Pathways’)
7. If a child is wait-listed for early childhood intervention services, consider making referrals using Chronic Disease Management accessing allied health services such as speech therapy, occupational therapy and physiotherapy (listed in FOLDER named ‘Referral Pathways’)
8. Consider accessing psychological services under Better Access (listed in FOLDER named ‘Referral Pathways’)
9. Seek the advice of a Maternal Child Health Nurse
10. Seek an opinion from a consultant paediatrician e.g. Monash Paediatric Advice Line 1800 623 483

Suggested Algorithm PEDS Pathways and Second Level Screening



It is recommended that GPs become familiar with these screens before using them in practice. Second level screens can be sent home with parent where appropriate. Include a review of past medical history and a full physical examination when reviewing a child for developmental concerns.

BPCIS = Brigance Parent-Child Interaction Scale; **M-CHAT-R** = The Modified Checklist of Autism in Toddlers (Revised); **PPSC-17** = The Pictorial Pediatric Symptom Checklist-17; ***Vanderbilt ADHD Parent Rating Scale**- aged 4y+ (also requires teacher input); ****Family Psychosocial Screen**-includes some sensitive questions.

Increasing the Delivery of Healthy Kids Checks-a Case Study
Developing a Complex Intervention

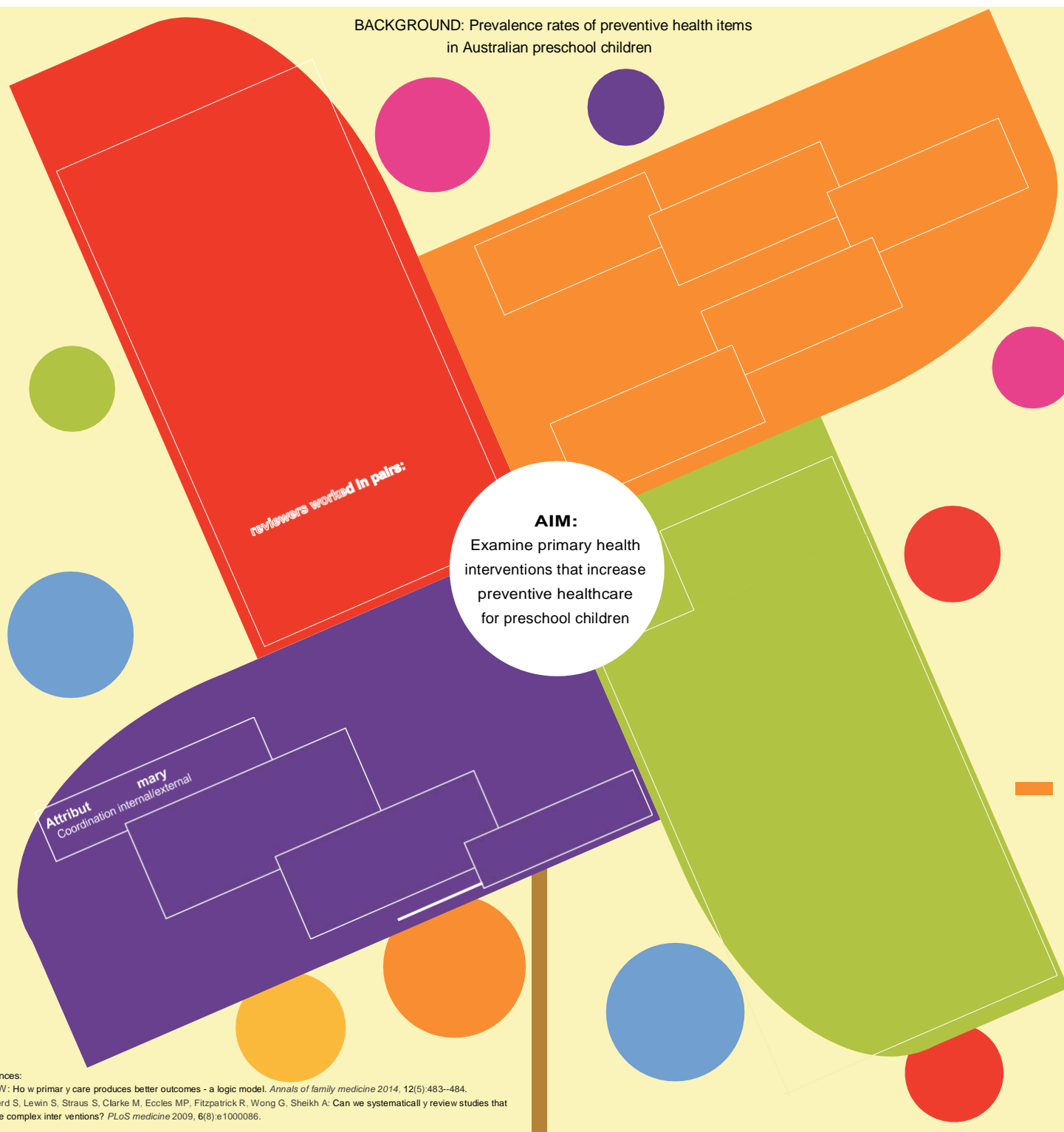
The Crazy Game of Complex Interventions



MONASH University

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Acknowledgements: Research funded by the Shepherd Foundation, Malvern, Victoria, and by a Chris Silagy Scholarship from the Royal Australian College of General Practitioners.

Interventions in general practice are frequently multi-component interventions (IVs) and synthesizing evidence presents additional challenges to researchers. Solutions to address complexity include: categorizing IVs by common features, using theory and taking a realist approach (Shepperd). The windmill represents the iterative process we have experienced trying to synthesize our findings.



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Healthy Kids Checks open 'can of worms' for GPs

2 November, 2012 [Kate Aubusson](#) [0 comments](#)

GPs fear the Federal Government's plan to screen three-year-olds for social and emotional problems will open a "can of worms" general practice is not equipped to handle, new qualitative data presented at the GP12 conference suggests.

The study involving 22 GPs and 18 practice nurses found GPs were reluctant to conduct the social and emotional well-being component of the Healthy Kids Check despite government assurances it will not lead to mental illness labelling for toddlers.

While the exact nature of the test are still unclear "GPs are concerned the interplay between child temperament, family dynamics, social circumstances will really complicate the assessment," lead research Professor Karyn Alexander told conference goers on Saturday.

"For some there was this fear of the can of worms," she said, with one GP likening the potential fall-out to the "medical and social monster" following the PSA screening campaign.

The group of Melbourne GPs and practice nurses from diverse socio-economic practices suggested early childhood educators were better placed to make the assessment.

They also questioned the value of screening when access to appropriate treatment could not be guaranteed and entry to allied health services often required diagnostic labelling.

But Professor Alexander argued that GPs have always been involved in the developmental assessment of children, and "broadening this to include more specific aspects of social and emotional development was not beyond our brief".

The checks could benefit from a more structured approach, perhaps supported by Medicare Locals, she said.



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Mar 7, 2013



Kids checks minus mental health?

■ Kate Aubusson

The Minister for Mental Health and Ageing has shied away from any mention of mental illness screenings when the Department of Mental Health and Ageing yesterday announced the roll out of the \$11 million roll out of the "improved" Healthy Kids Checks had begun.

The expanded checks, now targeting three-and-a-half to five year olds, will be used in eight Medicare Local areas over 2013 and rolled out nationally in 2014 after the Government accepted the advice of the Expert Working Group to phase in the changes slowly.

Ultimately, Mr Butler said, the checks were about "helping parents to pick up on developmental issues early and provide the right support



for kids".

Changes to the Checks have come under fire in recent months over concerns that the social and emotional wellbeing components tread dangerously close to mental illness screening for toddlers.

The Minister's announcement does not describe the additions to the checks in these terms, instead referring to an assessment of "interaction with others".

But a statement published on Medicare's website in January reads "the Healthy Kids Check will now also consider the emotional

wellbeing and development of the child to give the best chance for preventing mental disorders, or providing early intervention to minimise the impact of mental illness."

"Mental Health in three-year-olds is difficult to specify and the changes to the checks have conjured up **concerns** in psychiatry of over diagnosing disorders such as ADHD and over prescribing to children," Dr Karyn Alexander, GP and child health care researcher at Monash University told 6Minutes' sister publication Psychiatry Update.

A focus on evidenced-based screening that moves away from emotional and behavioural wellbeing assessments would be preferable, she said.

What do you think?

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GPs can play bigger role in assessing children's fitness for school

Natasha Boddy

One in five children is developmentally vulnerable when they start school and a pilot study is looking at ways how family doctors can help boost the uptake of healthy children checks.

Melbourne GP and PhD student Karyn Alexander spoke about a study to increase the uptake of the checks in general practice at the Primary Health Care Research Conference in Canberra on Wednesday.

"More than a fifth of children are arriving at school not really prepared for the rigours of a school life and I feel general practice can help address some of this," Dr Alexander said.

"Using the healthy kids check is one aspect of preventive health and it's like a leverage point.

"It really offers an opportunity for a conversation for a point where you can actually check with parents how they think the development of the child is going and make assessments, make physical assessments. You can check the child's weight and height and body mass index and deliver health messages around that and also things like vision and their oral health.

"I'd like to see general practitioners become a little bit more involved in preventive health care for preschool children. This is something we do everyday for our adult populations and we can bring it right back and start doing some preventive health for preschoolers."

Dr Alexander said an intervention program was being piloted in the east of Melbourne in an area which had a highly vulnerable population.

"We're piloting the intervention to increase the uptake of healthy kids checks from general practice and obviously alongside that, improving the quality of any assessment that is made," she said.

"It's a whole of practice intervention so we go in and deliver some training modules to the office staff as well as the nursing and clinical staff, the GPs and go from there and help them with some referral processes and some structured developmental surveys that they can use as part of the healthy kids check."

It comes as a new campaign encouraging Canberra school children to get at least an hour of physical activity daily was launched on Wednesday.

The Active Kids Challenge kicked off in 67 ACT primary schools this week with the eight-week program involving more than 850 classrooms and 20,000 students.

Physical Activity Foundation chief executive Lucille Bailie urged families to ensure children were getting enough physical activity.

She said children needed a minimum of 60 minutes daily physical activity and at least half of that needed to come from the home environment.

Healthy Kids Checks a budget casualty

13 May, 2015 Michael Woodhead 10 comments Read Later

Healthy Kids Checks MBS items have been abolished in the federal budget, with the government saying they offer no benefit over standard GP checks that cost half the price.

In a measure that will save \$144 million over the next four years, Health Minister Sussan Ley says the checks for three-year-olds will be discontinued from November because they are an expensive, non-evidence-based gimmick introduced by Labor in 2008.

"This service was always a straight duplication of existing high-quality state infant checks and GP services, but at a premium price for parents and taxpayers, and there's no medical evidence to back up why," she says.

On Wednesday - the day after the budget - the minister released figures showing that a 30-45-minute visit for a Healthy Kids Check would attract an MBS rebate of \$137.90, whereas an equivalent GP Level C attendance item would cost only \$71.70.



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This was the basis for the government's abolishment of Healthy Kids Check items, she said.

"You need to have the resources and a nurse there. You need a whole system really. It's not just a case of saying come in for a Level C consultation, that's just not going to happen," she said.

Dr Michael Fasher, a Blacktown GP with an interest in paediatrics, said it was disappointing to see further disinvestment in general practice at a time when evidence was starting to emerge to show the value of the Healthy Kids Checks.

"The end result is taking more funding out of general practice instead of having a conversation about how can we invest in general practice in ways that ensure deliverable and desired outcomes. For that, we need an overall policy picture about where child health is heading in the next 10-15 years," he said.

"This is happening just as the Commonwealth is taking funding out of health NGOs and state governments are disinvesting in community health.

"So there's a double whammy of funding decisions with no policy of where we want child health to go. This just adds to the demoralising of the workforce."

Q&A: Healthy Kids Check budget cuts

18 May, 2015 [Michael Woodhead](#) 0 comments [Read Later](#)

After seven years, the Healthy Kids Check is to be abolished as part of budget cost-saving measures.

Michael Woodhead talks to Dr Karyn Alexander, a Melbourne GP, who is conducting research for a PhD thesis, about the check's effectiveness and the impact of its demise.

Related News: [Healthy Kids Checks a budget casualty](#)

Q. Is the Health Minister correct in saying the Healthy Kids Checks are not evidence-based?

Dr Alexander (pictured): We haven't done enough research to make that call. The studies haven't been done — but it's an absence of evidence rather than evidence that they are not efficacious.

The only published research is from two Queensland practices, which showed that up to 11% of children had some sort of concern identified [on health checks] that could be acted on.

Q. Do you believe Healthy Kids Checks are useful?

Dr Alexander: When they were rolled out, they got off to a bad start. There were items that were not evidence based, such as asking a five-year-old if they wet the bed. But I've done an audit of my practice and found there were a number of children picked up with vision problems and dental problems that were previously unknown.

These are things that wouldn't normally be done as part of a GP's routine. They're not going to be done unless you have specific items to check off and look for.

Q. Can child health checks be performed as part of a level C consultation?

Dr Alexander: It may be argued that we should be doing these preventive examinations as part of routine childcare, but unfortunately most of the times children come in [to the GP] they are sick and it is difficult to gain co-operation of a sick young child. So it is great having this protected time where a parent is able to have a conversation with a GP about the developmental progress of their children and bring up any concerns they may have.

It's not just the case of saying come in for a level C consultation. You've got to have the resources there, the nurses there. It needs a whole system behind it. I think the impetus to do that without this Healthy Kids Checks' structure will be removed; it just won't happen.

Q. Can health checks be done by maternal child health nurses?

Dr Alexander: The argument that maternal child health nurses are already providing these health checks and that we're duplicating it in general practice is a false one.

A substantial proportion of children don't get those health checks with state-based services, for a variety of reasons — by three or four years of age the parents may be back at work and don't have time to take children to a nurse.

Q. What will happen after Healthy Kids Checks are abolished?

Dr Alexander: I think it's a lost opportunity. I am fearful that the opportunities to check vision and oral health will go. I don't think we'll be maintaining those assessments.



GPs slam end of Healthy Kids Check

Michael Woodhead | 20 October, 2015 | 8 comments [Read Later](#)

The imminent abolition of Healthy Kids Check on 1 November is an unwarranted and retrograde step for preventive health, GP academics say.

Health Minister Sussan Ley's decision to scrap the \$137.90 MBS item cannot be justified by alleged lack of evidence of benefits for children or duplication with state-funded child health services, according to Dr Karyn Alexander and Professor Danielle Mazza of the department of general practice at Monash University, Melbourne.

Related Q&A: [Healthy Kids Check budget cuts](#)

The Healthy Kids Check has promoted a shift to preventive healthcare in primary care, and children will now miss out on early interventions for conditions such as autism, obesity and dental health, they write in this week's *Medical Journal of Australia*.

Practice nurses will also be excluded by the government's expectation that health assessments are carried out as part of a level C attendance item.

"Without the signal that the Healthy Kids Check gives to parents ... children will continue to miss out on preventive health activities routinely delivered to other sectors of the population," they said.

"By scrapping the Healthy Kids Check, not only are we reducing the chances of identifying problems earlier, but we are effectively reducing the capacity of general practice to promote the health and development of young children."

MJA 2015; 203:321.

Autism care needs team approach

RACHEL WORSLEY

GPs have seen a dramatic rise in consultations for psychological care of young people with autism spectrum disorders (ASD), Australian figures show.

The number of ASD cases encountered by GPs increased eightfold from 46 per 100,000 encounters to 386 between 2000 and 2013, according to analysis of BEACH data.

Most of the ASD consults were for children aged 5-9, and were for psychological symptoms, social issues and also "filling in forms", the University of NSW study has found.

Researchers say the rise in presentations of ASD has created a "clinical bottleneck" and show that GPs require specific support and tailored tools to help diagnose, manage and refer chil-

dren with the condition.

Melbourne GP Dr Karyn Alexander, who has an interest in child health, agrees that GPs may have trouble managing psychological difficulties in children with autism, but she does not believe upskilling is the only answer.

"Children do need long-term care and GPs can support in that care, but multidisciplinary input is

important for long-term outcomes," she says.

The study also highlights the need for GPs to be able to tap into an easily accessible professional referral network, like networks for mental health professionals, Dr Alexander says.

"I don't think it's just a case of going to an online resource all the time.

"GPs like to know who they are referring to, they

like to have confidence in paediatricians and the allied health services they are referring to.

"The only things we've got at our disposal are GP mental health plans and psychological services like speech therapy.

"But we need a multidisciplinary team behind the GP to help the child go through school and later life."

Autism 2017; online.



Dr Karyn Alexander doesn't believe upskilling is the ans