Title page

Original Article

Improving assessment of child development: results of a Quality Improvement intervention in general practice

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Running title: Improving child developmental assessment

Acknowledgements

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Abstract:

Aims

Parents' Evaluation of Developmental Status is a validated tool used to assess child development that has not previously been tested in Australian general practice. We examined the effect of a Quality-Improvement intervention in a single general practice in Melbourne, Australia, that aimed to use this tool to improve documented assessment of child developmental surveillance during vaccination-visits.

Methods

Mixed methods incorporated audits of clinical records of children aged 1-5 years, before and after intervention, written questionnaires and a focus group (informed by the Theoretical Domains Framework and COM-B model) with clinical and non-clinical staff.

Results

After six months, developmental surveillance more than doubled and was documented in more than one in three visits (34.1%). Almost one in five (18.6%) vaccination-visits included the Parents' Evaluation of Developmental Status tool. Overall, the tool was positively received with staff expressing high levels of comfort asking parents to complete it (92.8%), increasing development of professional skills (71.4% staff) and confidence (55% clinicians) detecting developmental delays. Thematic analysis of the focus group transcript revealed underlying barriers arising from the practice environment, staff capabilities and motivation.

Conclusions

In a whole of practice Quality-Improvement intervention that applied Parents' Evaluation of Developmental Status training and implementation, including the receptionist in the medical team more than doubled documented rates of child developmental surveillance during vaccination-visits. Solutions to underlying barriers could be incorporated into a revised training module. Future studies need to test the tool in more methodologically robust studies that include analysis of the outcomes of developmental surveillance.

Key words (Medline)

Child, child development, developmental disabilities, general practice, parents, quality improvement

BRIEFPOINTS

What is already known on this topic

1. Australian GPs and Paediatricians lack awareness of child developmental screening tools, like PEDS
2. PEDS is already widely used in Australian primary care but not in the general practice setting
3. Quality Improvement studies in the United States have demonstrated increased rates of child developmental surveillance

What this paper adds

1. Child developmental screening tools, like PEDS, can be incorporated into vaccination visits with children in Australian general practice.
2. PEDS implementation was a valid and measurable Quality Improvement activity
3. A PEDS-Quality Improvement intervention in general practice significantly increased rates of child developmental surveillance

Introduction

General practice guidelines recommend opportunistic and proactive preventive healthcare with the general population, including children and young people.⁽¹⁾ Relatively frequent visits to general practice for young children with minor illness provide additional opportunities for prevention and health promotion. A large component of preventive health in young children is the repeated, often systematic, examination and tracking of child development, termed developmental surveillance or developmental screening. Implementation of childhood developmental screening programs faces a number of challenges. One challenge is the sensitivity and specificity of screening questionnaires for child development.⁽²⁾ Another challenge is the time taken to administer screening tests that cover all aspects of child development (sensory, motor, cognitive, language and social).⁽²⁾ Solutions have proposed systems for opportunistic testing that replace direct clinical observation with accurate recording and interpretation of *parent observations* of child development.⁽³⁾

One such system is the Parents' Evaluation of Developmental Status (PEDS) tool, a parent questionnaire of child health and development that is scored and interpreted by clinicians (Box 1). PEDS, originally developed in the US and designed to be implemented in primary care,⁽³⁾ has been validated for use in Australia.⁽⁴⁾ PEDS is already widely applied by Child and Family Health Nurses (CFHN) in Victoria and beyond, in the setting of "well-child care" and colocated vaccination services.⁽⁵⁾ Although it is recommended by guidelines as a tool to support the documentation of developmental progress,⁽¹⁾ PEDS has never been tested in Australian general practice. It is not known if general practice nurses (PNs) or general practitioners (GPs) would find it feasible and acceptable to incorporate PEDS into typical child health

consultations, and its subsequent utility— whether it helps families to access interventions earlier – is unknown. The aim of this study was to evaluate the effect of PEDS-training and implementation in a practice-based Quality Improvement (QI) intervention to improve documented assessment of child development during GP visits for vaccinations (excluding travel vaccinations) and to determine its feasibility and acceptability. Vaccination consultations avoid the situation where a child might be too unwell to participate in developmental assessment.

Methods

QI is a system of reviewing and adjusting practice processes to improve quality, safety and access to health care.⁽⁶⁾ Accumulated evidence suggests that QI activities are more likely to produce positive change when a ‘whole-of-practice’ method is adopted.⁽⁷⁾ Therefore, this study incorporated all members of the practice team in the QI process and took a mixed-methods, exploratory and sequential approach that incorporated all aspects of the research question (Figure1).

Setting and participants

The study was conducted in a large general practice clinic (15 GPs, 5 PNs) located in a socioeconomically emerging urban area, west of Melbourne, Australia. Ethics approval was obtained from the Royal Australian College of General Practitioners and conformed to recognised standards. All participants gave informed consent to be involved in the study.

- All clinic staff received one hour of training regarding the use of PEDS. In addition: Reception staff were provided with PEDS resources, trained to identify age-eligible children and deliver PEDS questionnaires to parents in the waiting room. Training incorporated role-playing “Handing the questionnaire to the parent” with a suggested script. GPs and PNs learned how to score and interpret completed parent questionnaires to identify children with developmental delay.
- Clinicians were provided with information regarding early intervention services to which they could refer
- PNs and GPs were given tip sheets to provide to parents regarding management of preschool behavioural problems.

Data collection

- **Audits**

Audits of clinical records of children aged 12 months to five years (< six years) recorded the number of children receiving developmental surveillance (PEDS or *any* documented developmental assessment) at the vaccination visit (excluding travel vaccinations). The audit was conducted three times. The baseline audit reviewed visits for three months prior to the intervention. The second audit studied 'augmented' vaccination visits for three months after training. A third audit took place after a further period of three months, following brief feedback to reception staff and placement of visual prompts, designed to remind staff to hand out PEDS questionnaires. We measured the number and proportion of vaccination visits with documented evidence of PEDS and, when PEDS was not evident, any other documentation of developmental assessment.

- **Questionnaires**

At the end of the study period post-intervention pen and paper questionnaires, tested for face validity and adapted from previous research with Australian GPs,⁽⁸⁾ used five-point Likert scales to survey staffs' beliefs, attitudes and self-efficacy regarding preventive healthcare and developmental examinations (reception-staff, 7 questions, clinical-staff, 12 questions) (Table1). Participants were also asked about their experience implementing PEDS and whether they had accessed parent tip sheets.

Post-intervention staff focus group

All staff were invited to a single focus group, lasting 45 minutes and conducted during a lunch time, to further explore experiences of the PEDS implementation process and gather views about the potential impact of PEDS on practice, referrals and outcomes. A second researcher, a GP-employee with experience conducting focus groups, led the discussion following an interview schedule informed by the Theoretical Domains Framework (TDF).⁽⁹⁾ This comprehensive framework consists of 14 domains relevant to changing health-related behaviours. These domains underlie three behavioural pre-requisites: Capability, Opportunity and Motivation, comprising the COM-B model (Figure 2).

Analysis

Oversight of the study, clinical audit and analysis was conducted by a GP-researcher who was also one of the practice owners. The proximity of the researcher to the data enabled sequential analysis of vaccination visits and this revealed that Influenza vaccination visits were managed differently to other routine childhood vaccinations. Consequently, these visits were excluded from the data. We calculated and compared the proportions of clinical records with documented evidence of PEDS and/or developmental assessment,

comparing vaccination visits at baseline, three and six months post intervention, using two-proportion Z-tests. Descriptive statistics were prepared from the results of post-intervention questionnaires.

Qualitative data were recorded, transcribed, and thematically analysed using a combination of inductive and deductive techniques. Specifically, codes were applied line-by-line to the raw data and sorted into themes derived from the domains of the TDF and the overarching COM-B model. (Supplementary Table 1).

Results

Documentation of developmental surveillance –PEDS or developmental assessment– more than doubled (2.5 times) following the PEDS-QI intervention (Table 2). A total of 345 vaccination visits were analysed, 119 at baseline, 117 during Phase 1 and 109 during Phase 2 of the study. In Phase 1, three months after intervention, PEDS was documented in the clinical records of 20.5% of vaccination consultations. In Phase 2, this declined slightly to 16.5%. In total, almost one in five (18.6%) vaccination visits included PEDS (increased 14.4%, 95% CI = 7.4 to 20.5, $P = 0.0002$).

When PEDS was not found in the clinical record *other* documentations of developmental assessment were assessed and found to have increased by 7.1% at the end of the study (95% CI -0.5099 to 13.5880, $P = 0.0635$). Overall, more than one in three vaccine visits (34.1%) documented *either* a PEDS questionnaire *or* some aspect of developmental assessment (i.e. developmental surveillance increased 20.7%, 95% CI 11.3 to 28.8, $P < 0.0001$) (Table 2).

Evidence of PEDS screening was found in 42 of a total of 226 records (18.6%). Thirty-four parents had no concerns. PEDS identified eight children with a total of ten parental concerns across three developmental domains: Four behavioural, three language (speech and hearing), and two social-emotional (plus one medical).

• Questionnaires

The PEDS-QI was generally positively received and improved staff self-reported skills and confidence. Questionnaires were completed by 11 of 18 (58.6%) eligible clinicians [eight of 13 GPs (two researchers excluded), three of five PNs] and three of 11 (27%) reception staff. Eleven (78.6%) staff felt that PEDS had been successfully implemented and eight (57.1%) easily adapted to new tasks and roles. After the study, 13 (92.8%) staff rated high levels of comfort asking parents to complete PEDS questionnaires. Ten (71.4%)

staff felt the PEDS-QI intervention had developed their professional skills working with young children and six (55%) clinicians expressed increased confidence detecting developmental delays (Table 2). GPs, PNs and reception staff held mixed beliefs about child developmental surveillance. Participants (57.1%) generally agreed that CFHN should be responsible for assessing the development of young children. Six participants (42.9%) believed that assessment of child development in general practice should only be assessed during vaccination-visits, whilst five participants (35.7%) thought development should be assessed by GPs at *every* visit.

Clinicians in this clinic expressed low levels of confidence detecting and managing child developmental problems. Despite six clinicians stating they felt confident in their ability to detect Autism spectrum disorders, only one clinician expressed confidence detecting developmental delays (without PEDS). None of the clinicians stated they had good knowledge of developmental milestones or of how to access early intervention services (Table 2).

- **Qualitative data**

The focus group with 11 participants (3/11 receptionists, 3/5 PNs and 5/15 GPs) provided additional insights into the PEDS implementation process, beliefs and attitudes regarding child developmental surveillance. Despite overall positive perceptions of PEDS barriers to developmental surveillance amalgamated staff capabilities, motivation factors and the constrained opportunities in the practice environment.

Capability

Reception staff admitted they sometimes forgot to hand out PEDS questionnaires and clinicians could not recall, or did not know, child developmental milestones:

“I think I’m the limitation, not the tool. Only because ... I don’t have a - I’ve never been interested or really well able to focus on all the different development charts.” (GP3)

Knowledge was shaped by personal rather than professional experience for nursing staff:

“Not having children, as well, I don’t know what the normal milestones are.” (N2)

New insights were gained regarding increased self-efficacy following training that included a suggested “script” to receptionists:

“The way to word it to parents as well - that was important to me” (R1)

One GP reflected how PEDS had changed the way he practiced:

“I find myself actively looking for the PEDS, that the parents have done the PEDS. If they’ve not done them, I’ll ask them if they have any concerns ... I’ll definitely ask whenever they come for a vaccination and things.” (GP 8)

Motivation

Despite most questionnaire-responses indicating high levels of comfort using PEDS, staff sometimes felt apprehensive about parents’ perceptions and the new tasks associated with PEDS:

“Most patients would like to be given something like that by a nurse. And I think that some reception staff might just generally not feel comfortable doing it ... it can be a bit hard.” (R2)

“I don’t want to score it when the parents are there anyway” (N1)

Participants worried that parents would become irritated by the repeated use of PEDS:

“So then if they start being given out at every vaccination is that going to annoy people ... they might get it two or three times?” (N3)

PNs’ beliefs about their capabilities and their perception of role boundaries also influenced their motivation to use PEDS for developmental assessment:

“The initial address [yes]. But after that we’d probably be grabbing you guys [doctors].” (N1)

“Yeah, just arranging for them to see their GP. I don’t think that I’d be equipped.” (N2)

“If it was, like, typical autistic symptoms, I think I would.”(N1)

Six months after implementation the outcomes of PEDS may have eluded some participants and affected their motivation to use PEDS:

“Ninety-nine per cent of them are normal, but if it came up positive and gave an issue or a concern, then it would be useful.” (GP3)

Opportunity

The pressures of time limitations in general practice impacted the delivery of PEDS:

“We have to score it but if something comes up and we don’t always have time. So we have to put that aside and do that later.” (N3)

The ‘season’ for Influenza vaccinations was singled out as a particular burden for the practice and temporarily derailed PEDS:

“Flu season when we we’re too busy to be able to do it.” (R1)

However, the audit had revealed that during vaccination consultations tasks were often duplicated: nurses documented whether the child was ‘well’ (afebrile, no previous reactions etc.) in preparation for vaccination and this same safety information was documented by the attending GP. It was suggested that removing this ‘duplication’ could save time, with the response:

“The thing is, I have to know that the child is well, there’s no issues. There’s those questions the nurses have already asked because it’s their responsibility but there’s things I need to ask because it’s my responsibility.” (GP3)

The systems that were established as part of PEDS enabled staff to overcome some of the barriers to implementation, and reception staff devised new mechanisms designed to keep them on track:

“When we do book imm’s in we’re supposed to put an alert in so, when they do book in or attend, it pops up. Or in their clinical notes we put “PEDS done on this date”, so we know the next one is in six months, so we’re not annoying the parents two weeks later. That’s what we’re doing. And for every day we have the PEDS forms set up with the child’s name sticky noted so we know what time the child is coming in.” (R1)

Discussion

This study shows that training and implementation of PEDS, in a whole of practice QI intervention, is feasible and significantly increases documentation and assessment of young children’s development during vaccination visits: Developmental surveillance more than doubled following the intervention. Moreover, PEDS was generally positively received, increased participants’ self-reported skills working with young children and, for just over half of clinicians, increased their confidence detecting developmental delays. One doctor stated PEDS had changed the way he conducted vaccination consultations in that he actively sought parents’ concerns whether PEDS was completed or not. PEDS also played a part in developing the receptionist’s role when they were allocated the specific task of handing out the PEDS-questionnaire to parents.

Nevertheless, PEDs-processes and new roles caused discomfort for some staff. Receptionists and PNs believed parents might react negatively (but were largely not born out) and clinicians', perceived or real, lack of knowledge of child development and screening outcomes reduced their confidence using PEDS. Reception staff clearly articulated that role playing and providing a suggested script –what to say when handing out PEDS– were useful strategies learned from PEDS training and future training could incorporate suggestions for the new office processes developed by the staff at this practice.

It was noticeable that, three months after implementation, there was a decrease in PEDS use when an influenza vaccine program for young children was funded for the first time through individual States and Territories, in Australia.⁽⁵⁾ This could have presented an opportunity to screen the development of many more children, but, instead, led to increased demand for clinical services (and many additional phone queries) so that staff felt overwhelmed. Other vaccinations recently introduced into the Childhood Immunisation Schedule⁽¹⁵⁾ (e.g. Meningitis B vaccine), were not associated with a drop-off in PEDS and were more evenly spread over the study period. This illustrates one of the vulnerabilities to sustaining long term delivery of QI and preventive activities and the need to reinforce processes (e.g. change-champion and environmental prompts).

This is the first report on the use of PEDS in general practice in Australia, where there is already extensive uptake of PEDS by other primary care providers (CFHNS). In this study, more than half of clinicians thought that CFHNS should be the major body responsible for assessing the development of children. It has previously been reported that both GPs and paediatricians lack awareness of developmental screening tools, including PEDS,⁽¹⁰⁾ representing a major barrier to implementing developmental surveillance. Expansion of the use of common screening tools, like PEDS, could improve communication and understanding regarding child development between healthcare professionals, enabling earlier detection and intervention of any delays.

This is also the first known Australian QI study to report a child preventive health initiative. The past decade has seen a push towards QI in general practice to lift quality and safety in health, reduce inequalities in care delivery and translate evidence into practice.^(6, 7) Australian case-studies have previously documented QI activities in diabetes and other chronic diseases, palliative care, adult preventive health and influenza vaccination.⁽¹¹⁾ A systematic review of primary care interventions aimed at improving preventive healthcare for young children identified 11 (of 29) QI studies, all from the United States (US).⁽¹²⁾ One of these applied PEDS to well-child care processes in two large urban primary care centres.⁽¹³⁾ Following PEDS

implementation almost two thirds of children (six months to eight years) completed developmental surveillance during visits and providers found screening easier than expected.⁽¹³⁾ The US context of 'well-child care' differs from our opportunistic application of PEDS to vaccination consultations, but both studies represent episodes of preventive care and approximately half of respondents in our study said they thought PEDS could be expanded into all routine child health consultations.

The US study found that more behavioural and developmental concerns were detected using PEDS and generated more referrals.⁽¹³⁾ Outcomes from our study were limited by small numbers of "positive" PEDS screening questionnaires, but our qualitative research, and that of others,⁽¹⁴⁾ suggest that knowledge of outcomes of screening is important for clinicians to remain motivated.

Strengths and limitations

The strengths of this study include the QI process that enabled PEDS to be readily incorporated into practice and the mixed methods approach that allowed exploration, analysis and a deeper understanding of how PEDS was implemented.

Nevertheless, we need to be cautious about the extent our intervention (measured over a short time period and using a pre-post study design) led to the observed findings, and therefore, how generalisable they are to other practices in Australia. In addition, one of the researchers was also one of the owners of the practice and this could have influenced PEDS uptake and participants' responses more favourably. However, our baseline measures of developmental assessment may have been higher than in other general practices due to prior interest in the topic (making improvement more difficult to detect). It is also possible that some PEDS questionnaires were not scanned into the health record and that use was underestimated by the audit.

Despite finding that the rate of developmental assessment more than doubled post-intervention, less than 20 per cent of children received a PEDS questionnaire and, therefore, four out of five children were not screened. Previous research regarding PEDS screening indicates that children who do not have developmental vulnerability recorded in their health record are more likely to be those children with developmental vulnerability.⁽¹⁶⁾ Additional audits would be useful to ascertain levels of PEDS use long term and further qualitative work could determine whether any unintended consequences eventuate (e.g. resistance from parents with repeated exposure to PEDS questionnaires). Further research could consider

interventions that use PEDS with *all* routine child visits in more rigorous studies and should explore PEDS outcomes.

Conclusions and future research

Arising from this study, we can recommend PEDS implementation as a valid and measurable QI process. Our findings indicate that practitioners' skills detecting developmental delay may benefit from PEDS but there remain significant gaps in knowledge and confidence relating to paediatric developmental problems that could benefit from further interventions (e.g. additional training).

This study showed that PEDS-QI is both feasible and acceptable. The findings suggest PEDS can increase clinicians' skills and confidence detecting developmental delays. Including the receptionist in the medical team more than doubled documented rates of child developmental surveillance during vaccination visits. Vaccination visits present opportunities for increasing preventive healthcare delivery but practices need to be adequately resourced to do so. Further research should test PEDS in more methodologically robust studies that include analysis of the outcomes from screening young children and feedback from parents.

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Box 1. Parents' Evaluation of Developmental Status (PEDS) consists of 10 questions for parents to complete

Eight questions reflect developmental domains:

- Receptive language
- Fine motor
- Gross motor
- Behaviour
- Expressive language
- Social-emotional
- Self-help
- School / pre-school skills

Two additional open ended questions

Tables and figures (see separate files)

Fig.2 COM-B Model ⁽⁹⁾

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Fig.1 Timeline for PEDS-QI study

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Table 1. Number and percentage of vaccination visits with *either* PEDS *or* developmental assessment and *total* developmental surveillance at each time-point in the study

Audit	Vaccination-	PEDS	Developmental	Developmental
Time-point	Visits (N)	(%, n)	Assessment (%, n)	surveillance (total) (%, n)
months (m)				
Baseline	119	4.2 (5)	8.4 (10)	13.4 (15)
Phase 1	117	20.5 (24)	17.1 (20)	37.6 (44)
(First 3m)				
Phase 2	109	16.5 (18)	13.8 (15)	30.3 (33)
(Second 3m)				
Total study	226	18.6 (42)	15.5 (35)	34.1 (77)
duration (6m)				

PEDS= Parents' Evaluation of Developmental Status

Table 2. Clinician and receptionist responses to questionnaire regarding PEDS implementation and child developmental surveillance

Questions	Strongly disagree	Disagree	No opinion	Agree	Strongly agree
1-7 All staff (n=14)					
8-12 Clinicians only (n=11)					
1.This practice has successfully implemented PEDS screening with routine childhood vaccinations		1	2	10	1
2.This practice has easily adapted to taking on new tasks and roles	1	3	2	7	1
3.I have developed my professional skills working with young children		1	3	10	
4.I rate good personal levels of comfort asking parents to complete questionnaires about their child's development			1	7	6
5.I believe Child and Family Health Nurses should be responsible for assessing the development of pre-school children		2	4	8	
6.I believe pre-school children should have their development assessed in general practice at every available opportunity	1	4	4	5	
7.I believe pre-school children should have their development assessed in general practice only during vaccination appointments (child is well)	1	5	2	5	1
8.I have good knowledge regarding how to access early intervention services for young children		7	4		
9.I feel confident in my ability to detect developmental problems (without PEDS)		7	3	1	
10.I feel confident in my ability to use PEDS to help detect developmental problems in children < 5 y		1	3	7	
11.I feel confident in my recall of infant and child developmental milestones		5	6		
12.I feel confident in my ability to detect the "red flags" for Autism in children under 5 years		4	1	6	

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