

The Evaluation of a Standardized Call/Recall System for Childhood Immunizations in Wandsworth, England

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Abstract To improve uptake of childhood immunizations in Wandsworth we developed a standardized call/recall system based on parents being sent three reminders and defaulters being referred to a Health Visitor. Thirty-two out of 44 primary care practices in the area implemented the intervention in September 2011. The aim of this study was to evaluate the implementation, delivery and impact on immunization uptake of the new call/recall system. To assess implementation and delivery, a mixed method approach was used including qualitative (structured interviews) and quantitative (data collected at three months post-implementation) assessment. To assess the impact, we used Student's *t* test to compare the difference in immunization uptake rates between intervention and non-intervention practices before and after implementation. The call/recall system was viewed positively by both parents and staff. Most children due or overdue immunizations were successfully captured by the 1st invitation reminder. After three invitations, between 87.3 % (MMR1) and 92.2 % (pre-school booster) of children identified as due or overdue immunizations successfully responded. Prior to implementation there was no difference in uptake rates between intervention and non-intervention practices. Post-implementation uptake rates for DTaP/IPV/Hib, MMR1, MMR2 and the pre-school booster were significantly

greater in the intervention practices. Similar findings were seen for PCV and Hib/MenC boosters, although the differences were not statistically significant at the 5 % level. Following the successful implementation of a standardized call/recall system in Wandsworth, other regions or primary care practices may wish to consider introducing a similar system to help improve their immunization coverage levels.

Keywords Primary health care · Immunization · Child health · Vaccination · Call/recall

Introduction

The World Health Organization (WHO) recommends that on a national basis at least 95 % of children receive three primary doses of diphtheria, tetanus, pertussis, polio and Haemophilus influenzae type b (DTaP/IPV/Hib) in the first year of life and more than 95 % receive one dose of a measles, mumps and rubella (MMR1) vaccine by 2 years of age [1]. In England, although immunization rates for children have been rising steadily, coverage levels for certain vaccines have not yet reached WHO targets. In 2010/11 the coverage level for DTaP/IPV/Hib in the first year of life was 94.2 %. For children reaching their second birthday, coverage for MMR1 was 89.1 % [2]. In 2010/11 the London Borough of Wandsworth achieved 91.2 % coverage of DTaP/IPV/Hib at 12 months and 82.4 % coverage of MMR1 at 24 months. However, coverage levels within the borough varied by primary care practice [2].

Several systematic reviews have concluded that patient reminder and recall systems in primary care settings are effective in improving childhood immunization rates in developed countries [3, 4]. All types of reminders were

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effective (postcards, letters, telephone or auto dialer calls), with telephone being the most effective [3, 4]. In 2010, Wandsworth Public Health Department conducted a baseline review of childhood immunization call/recall systems in primary care practices within the borough. It concluded that although some good practice was occurring and approximately half of all practices had some elements of a call/recall system in place, none had a holistic system which identified children, invited them for immunization, recalled them if they defaulted and followed up repeat defaulters. In addition, several practices welcomed the development of some guidance. In response to this, and also to the need to improve childhood immunization uptake and reduce variation in performance, we developed a standardized call/recall system for childhood immunization in primary care. The new system was successfully piloted in two Wandsworth primary care practices in May 2011. Subsequently, it was rolled out to all primary care practices in Wandsworth in September 2011. This report assesses the impact of the new standardized call/recall system on local immunization uptake rates in Wandsworth and summarizes key evaluation findings.

Method

Study Population

The study setting was the London Borough of Wandsworth. It has a population of 290,999 with 7.5 % of the population under 5 years old [5]. In September 2011, we invited all 44 primary care practices in Wandsworth to take part. Thirty-two practices signed up to implement the new call/recall system. The main reasons for practices not signing up included not having the time or capacity to engage in a new activity, and the perception of already having an effective call/recall system in place.

Intervention

The standardized call/recall system we developed was based on national evidence-based guidance [6] and incorporated local and regional good practice approaches [7]. Figure 1 is a flow chart of this call/recall system. It is designed to be used for children aged 0–5 years old registered with a Wandsworth primary care practice, and who are due or overdue for their routine childhood immunizations.

Following recruitment we met with the Immunization Lead at each practice to describe and set up the call/recall system. Firstly, we assisted practices in standardizing all immunization related Read Codes within EMIS[®] Web, the clinical information system used by all primary care practices in Wandsworth [8]. We then helped set up standardized EMIS[®]

Web searches for routine childhood immunizations which would allow data on children due or overdue for immunizations to be quickly extracted from the system. We expected the practices to run these searches every 2–4 weeks. Once children were identified, practices were expected to send out first invitation letters and make appointments for those who responded. Those children not responding or not attending their appointment were then identified again, so called first defaulters, when the clinical system searches were repeated after 2–4 weeks (Fig. 1). These children were sent a second invitation. Second defaulters were identified at the next clinical system searches and sent a third invitation. Third defaulters were subsequently referred to the Health Visitor attached to the practice whose responsibility it was to attempt to make contact (via telephone and/or home visit) with the child's parents/guardians to provide advice and signposting to local immunization services (Fig. 1). Health Visitor input in the later stages of the system was also considered important for purposes of safeguarding children.

Process Measures

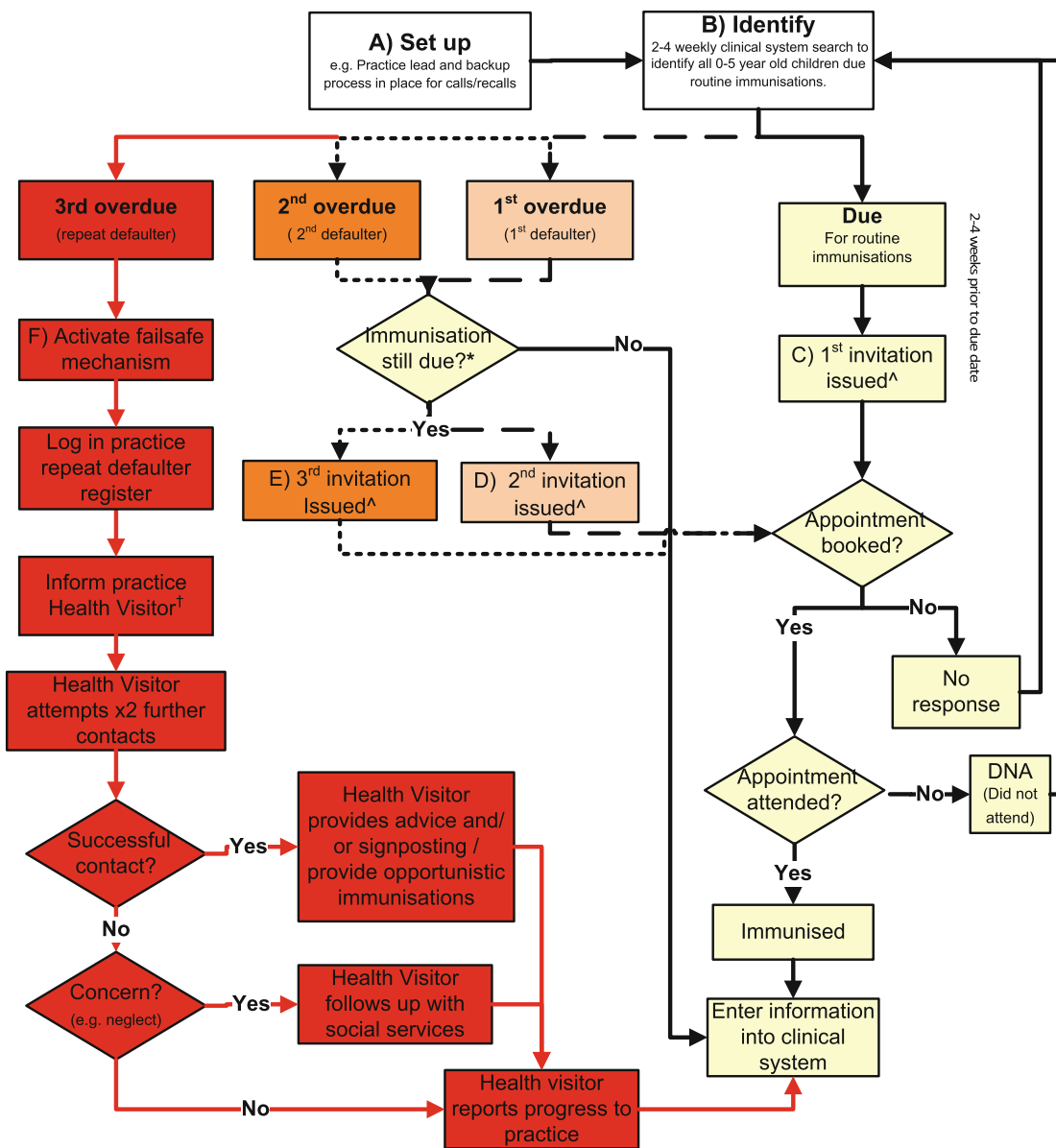
We used a standard monitoring template to be completed by each practice at 3 months post-implementation to collect quantitative and qualitative process data. This captured information on: (1) how often clinical system searches were being carried out, (2) the proportion of children identified getting a 1st, 2nd and 3rd invitation, (3) what types of invitations/reminders were being used and (4) general feedback with regards to steps in the process that worked well and those that proved challenging. In addition, qualitative process data was obtained from structured interviews with Immunization Leads within the practices.

Outcome Measures

The primary outcomes were the percentage of children up-to-date with their immunizations at:

1. 12 months of age for 3 doses of DTaP/IPV/Hib
2. 24 months of age for MMR1, Hib/MenC booster and PCV booster
3. 5 years of age for DTaP/IPV pre-school booster and two doses of MMR (MMR2)

Practice-level data were extracted from RiO [9], Wandsworth Public Health Department's electronic patient records system and EMIS[®] Web. RiO was used in addition to EMIS[®] Web to calculate the numerator for the coverage data because, as well as capturing childhood immunizations in primary care practices, it captures immunizations done by school nurses and community immunization teams. RiO was also used in addition to EMIS[®] Web to calculate the denominator because it provides more



Notes

All activity should be entered into the practice clinical information system

*Immunisation still due?: Check latest immunisation status and contact details in clinical system etc, e.g. have immunisations already been given or refused or has child moved address?

[^]1st, 2nd and 3rd invitation issued: Practice issues notifications/reminders to child's parent/guardian via letter, card (e.g. birthday card) or telephone. Use at least two different methods to communicate between 1st, 2nd and 3rd invitation. Log all activity in clinical system.

[†]Inform practice Health Visitor (failsafe): Agree communication mechanism with Health Visitor, e.g. copy 3rd invitation letter to Health visitor, referral form, via practice meeting or repeat defaulter log book/list. Health Visitor makes two attempts to contact the child's parents/guardians (via telephone, letter, home visit) using their latest contact details. Their role is to provide telephone advice and/or, if family agree, signpost to local immunisation service, e.g. child's GP or the local Immunisation team.

Fig. 1 The Wandsworth standardized call/recall system flow chart for childhood immunizations in primary care

complete and up-to-date information on patients' addresses and registered primary care practices.

Coverage data were reported by financial year quarter, defined as Quarter 1 (April-June), Quarter 2 (July-September), Quarter 3 (October-December) and Quarter 4 (January-March).

Statistical Analysis

Qualitative process data from the structured interviews were analyzed by first reading and re-reading written feedback and transcripts, followed by open coding. In this report we have included a descriptive summary of the main

themes and issues relevant to the implementation and delivery of the new call/recall system.

The statistical analysis of the outcome data was designed to test the hypothesis that the immunization uptake of selected vaccines at 12, 24 months and 5 years of age in primary care practices that implemented the new standardized call/recall system would improve post-implementation. To take into account the possibility that secular trends accounted for the improvements in immunization uptake rates, we used Student's *t* test for unpaired data [10] to compare practices that had implemented the call/recall system (intervention group) to those that had not implemented it (non-intervention group). We compared both pre- and post-implementation uptake rates to determine whether there was a difference at baseline between the two groups and whether the intervention had increased the difference in uptake rates between the two groups post-implementation. A difference was statistically significant if $p < 0.05$.

Results

Thirty-two out of 44 primary care practices in Wandsworth (72.7 %) implemented the call/recall system in full in September during the 2011/12 financial year.

Process Measures

Table 1 details the quantitative process data collected from participating primary care practices. Of the 32 practices who implemented the new call/recall system, the majority ran clinical system searches on a monthly basis (81.3 %). Most practices (84.4 %) followed our recommendation and used at least two different methods of communication between 1st, 2nd and 3rd invitation. Sending a letter was the most popular method at 1st invitation with more variety of methods used at 2nd and 3rd invitation, including phoning and/or texting. The number of children identified by the call/recall system searches over the 3 month monitoring period varied depending on the practice list size and the immunization type. The highest number of children identified were those due or overdue the pre-school booster. Over the 3 month monitoring period an average of 78.6, 43.0, 10.3 and 6.2 children per practice required 1st, 2nd, 3rd invitation and Health Visitor referral for the pre-school booster, respectively (Table 2). In contrast, the lowest number of children identified were those due or overdue DTaP/IPV/Hib (Table 2). We found that all identified children due or overdue immunizations were issued a 1st invitation and that the 1st invitation was the most effective in reducing the number of defaulters. Between 45.3 % (pre-school booster) and 66.3 % (DTaP/IPV/Hib) of those receiving a 1st invitation did not require

further recalling (Table 2). After 3 invitations, between 87.3 % (MMR1) and 92.2 % (pre-school booster) of children identified as due or overdue immunizations successfully responded (Table 2). A successful response included either the child being immunized or parents informing the practice that they had made an informed decision not to immunize their child. Across immunization type, approximately one-fifth of children referred to Health Visitors subsequently made appointments for immunization. The others refused immunization, had moved address and/or registered primary care practice or were non-contactable.

Immunization Leads responsible for overseeing the implementation and delivery of the call/recall system identified a number of challenges. These included increases in workload from additional calls made to parents/guardians and additional calls from parents/guardians to book immunization appointments, and needing to identify a champion within the practice to ensure the call/recall process proceeded as planned. In addition, some practices found encouraging repeat defaulters to take up immunizations challenging. Successes included: the new system was seen to be easy to follow, very useful and an improvement to existing call/recall processes; it resulted in staff learning new skills with respect to searching and coding within EMIS® Web; and it was well received and liked by parents/guardians.

Outcome Measures

At baseline, in Quarter 1 2011/12 preceding implementation of the new call/recall system, we found no statistically

Table 1 Process measures for the 32 primary care practices using the standardized call/recall system

Process measure (N = 32)	No. (%)
No. (%) of practices running clinical system searches	
Monthly	26 (81.3)
Fortnightly	6 (18.7)
No. (%) of practices at 1st invitation using	
Letter/birthday card/reminder card	24 (75.0)
Telephone	6 (18.7)
Text	2 (6.3)
No. (%) of practices at 2nd invitation using	
Letter/birthday card/reminder card	13 (40.6)
Telephone	17 (53.1)
Text	2 (6.3)
No. (%) of practices at 3rd invitation using	
Letter/birthday card/reminder card	10 (31.3)
Telephone	18 (56.2)
Text	4 (12.5)
No. (%) of practices using ≥ 2 communication methods between 1st, 2nd and 3rd invitation	27 (84.4)

Table 2 Number of children due or overdue immunizations identified by the standardized call/recall system for the 32 primary care practices using the system

Variable (N = 32)	No. (%)
Mean no. (%) of children identified as due DTaP/IPV/Hib per practice	
Sent 1st invitation	50.7 (100.0)
Sent 2nd invitation	17.1 (33.7)
Sent 3rd invitation	9.1 (17.9)
Referred to health visitor for follow-up	5.2 (10.2)
Refused immunization, moved practice or non-contactable	4.2 (8.3)
Mean no. (%) of children identified as due MMR1 per practice	
Sent 1st invitation	64.5 (100.0)
Sent 2nd invitation	33.9 (52.5)
Sent 3rd invitation	14.3 (22.1)
Referred to health visitor for follow-up	8.2 (12.7)
Refused immunization, moved practice or non-contactable	6.6 (10.2)
Mean no. (%) of children identified as due Hib/MenC booster per practice	
Sent 1st invitation	64.5 (100.0)
Sent 2nd invitation	33.9 (52.5)
Sent 3rd invitation	17.4 (27.0)
Referred to health visitor for follow-up	7.4 (11.4)
Refused immunization, moved practice or non-contactable	5.9 (9.1)
Mean no. (%) of children identified as due PCV booster per practice	
Sent 1st invitation	66.3 (100.0)
Sent 2nd invitation	33.6 (50.7)
Sent 3rd invitation	24.7 (37.2)
Referred to health visitor for follow-up	6.8 (10.2)
Refused immunization, moved practice or non-contactable	5.4 (8.1)
Mean no. (%) of children identified as due 2nd MMR dose per practice	
Sent 1st invitation	72.6 (100.0)
Sent 2nd invitation	38.7 (53.3)
Sent 3rd invitation	9.5 (13.1)
Referred to health visitor for follow-up	6.3 (8.7)
Refused immunization, moved practice or non-contactable	5.0 (6.9)
Mean no. (%) of children identified as due DTaP/IPV pre-school booster per practice	
Sent 1st invitation	78.6 (100.0)
Sent 2nd invitation	43.0 (54.7)
Sent 3rd invitation	10.3 (13.1)
Referred to health visitor for follow-up	6.2 (7.8)
Refused immunization, moved practice or non-contactable	5.0 (6.4)

significant differences in uptake rates between intervention and non-intervention practices (Table 3). However, post-implementation uptake rates in Quarter 1 2012/13 for

DTaP/IPV/Hib, MMR1, MMR2 and the pre-school booster in the intervention practices were significantly greater than those in the non-intervention practices (Table 3). Similar findings were seen for PCV and Hib/MenC boosters, although the differences were not statistically significant at the 5 % level.

Discussion

Our study found that implementing a standardized call/recall system to improve childhood immunization uptake rates is both feasible and effective. Overall, 32 out of 44 primary care practices in Wandsworth implemented the new standardized call/recall system in September 2011. The majority of practices ran monthly clinical system searches to identify children due or overdue immunizations and used at least two different methods for communicating with parents/guardians for 1st, 2nd and 3rd invitations. In general, the highest number of children identified by the searches was those due or overdue the pre-school booster, and the majority of children receiving a 1st invitation were successfully contacted and did not require further recall. Of note the highest number of defaulters within the call/recall system was for MMR1. This likely reflects the continued impact of adverse publicity on MMR vaccine uptake. Primary care staff welcomed the new system. They found it easy to use and well received by parents/guardians. There were however some concerns with respect to the increased workload from additional calls to and from parents/guardians. We found that the standardized call/recall system had a positive impact on immunization uptake rates in those practices that adopted the new system. Prior to implementation there was no difference in uptake between intervention and non-intervention practices. Post-implementation uptake rates for DTaP/IPV/Hib, MMR1, MMR2 and the pre-school booster were significantly greater in the intervention practices. Similar findings were seen for PCV and Hib/MenC boosters, although the differences were not statistically significant at the 5 % level.

Our results are in keeping with the findings from the existing literature [3, 4] which support the general recommendation that all primary care practitioners should consider reminder/recall systems to improve immunization coverage levels of their practices [6]. Several systematic reviews have concluded that patient reminder and recall systems in primary care settings are effective in improving childhood immunization rates and that more intensive systems, such as those using multiple reminders, appear to be more effective than single reminders [3, 4]. Since call/recall systems have been widely shown to be effective in a variety of settings, this study adds to the existing literature by focusing on how a standardized approach to call/recall

Table 3 Mean immunization uptake rates (%) for intervention and non-intervention primary care practices in Wandsworth before and after implementation of the standardized call/recall system

Immunizations	Immunization uptake rate (%)					
	Pre-implementation, Q1 2011/12			Post-implementation, Q1 2012/13		
	Intervention group	Non-intervention group	Difference (95 % CI)	Intervention group	Non-intervention group	Difference (95 % CI)
DTaP/IPV/Hib ^a	93.8	91.7	2.1 (−1.7, 6.0)	93.5	79.6	13.9* (3.2, 24.6)
MMR1 ^b	87.8	84.4	3.4 (−3.7, 10.4)	90.1	76.3	13.8* (3.4, 24.2)
Hib/MenC booster ^b	95.8	94.0	1.8 (−1.8, 5.4)	95.0	86.3	8.7 (−1.7, 19.1)
PCV booster ^b	97.6	98.6	−1.0 (−3.7, 1.6)	97.5	89.3	8.2 (−2.3, 18.7)
DTaP/IPV pre-school booster ^c	78.0	72.4	5.6 (−7.1, 18.3)	85.3	69.6	15.7* (4.3, 27.2)
MMR2 ^c	81.9	76.5	5.4 (−6.7, 17.5)	85.1	70.2	14.9* (3.9, 25.9)

* Statistically significant at the 5 % level; $p < 0.05$

^a 3 doses at 12 months of age; ^b at 24 months of age; ^c at 5 years of age

can be successfully implemented and delivered in a real life setting at a local-level.

The main strengths of this study are that it was conducted in a real life setting and that both process as well as outcome measures were evaluated. This allowed us to assess the practicality and feasibility of implementation and delivery, in addition to the likely impact on uptake rates when more rigorous study conditions are not in place. There are a number of limitations to this study. Firstly, the lack of randomization of primary care practices limits our ability to make definitive conclusions about whether the new call/recall system was the reason for the differences found between intervention and non-intervention practices with respect to post-implementation uptake rates. This is because primary care practices that chose to implement the new call/recall system may be systematically different from those that did not. In addition, it is not possible to exclude that other external factors may have masked or augmented the changes in uptake rates seen. However, we know of no other major childhood immunization intervention occurring during this period in Wandsworth. Generalisability of our findings is also an issue as practice-level interventions such as a call/recall system may be unsuccessful in areas where a large proportion of children are not registered with a practice.

Implications for Research or Practice

There are encouraging early signs that the standardized call/recall system for childhood immunizations is improving uptake in primary care practices in Wandsworth. However, long-term follow up is required to provide more definitive evidence that the intervention is having a sustainable impact on coverage levels. Also, to sustain the effectiveness of the call/recall system, primary care staff

need to be supported in managing the additional workload. Further work is required to ensure all practices that implemented the new call/recall system continue to use it and that the remaining 12 practices that did not implement the system are encouraged and supported to adopt it. Successfully adopting a standardized call/recall system across all practices in Wandsworth will not only help to improve immunization uptake rates in the borough but by taking this source of variation out of the equation will allow us to focus on other factors which may be responsible for variations in uptake rates seen between primary care practices. In addition, our results demonstrate the continued impact of adverse publicity on MMR vaccine uptake. Thus, as health professionals, we should consider an extended or more targeted strategy for MMR to mitigate ongoing public misconceptions.

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Ethical approval No ethical approval was required for this study.

Conflict of interest The authors declare no conflict of interest.

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