



Brief Original Report

Assessing the burden of undeliverable immunization reminder and recall notifications

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ARTICLE INFO

Available online 6 October 2011

Keywords:

Vaccinations
 Immunization information systems
 Immunization registries
 Reminder/recall systems
 Local health department
 Adolescents

ABSTRACT

Purpose. To assess the completeness and accuracy of parent contact information for the delivery of mailed reminder/recall notices using a statewide immunization information system (IIS).

Methods. The Michigan Care Improvement Registry (MCIR) was used to generate reminder and recall notifications for children ages 6 months–19 years in Michigan (2008–2009). Mailed notifications were classified as being undeliverable if they were returned to the local health department (LHD) by the US Postal Service.

Results. 20,377 notifications were mailed and 5182 (26%) were undeliverable. Undeliverable notification increased with age (reference, 6–18 months): 19–35 months (OR = 1.27), 36–71 months (OR = 3.03) and adolescents 11–19 years (OR = 4.94). Children enrolled in Medicaid (OR = 0.76) were less likely to have an undeliverable notification compared to their non-enrolled counterparts, but children who had previously received some (OR = 1.07) or all vaccinations (OR = 2.43) at an LHD were more likely to have an undeliverable notification.

Conclusion. Undeliverable reminder/recall notifications are most likely among adolescents. Efforts to identify alternate sources of parent contact information may be an important strategy to improve the successful delivery of reminder/recall notifications, especially for adolescents.

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Introduction

Immunization recall is recommended as an effective strategy to improve vaccination rates (Guide to Community Preventive Services, 2007). Mailed immunization reminder/recall notifications have been reported to improve immunization rates among children in a variety of settings (Dini et al., 2000; Gaglani et al., 2001; Guide to Community Preventive Services, 2007; Lieu et al., 1998; Szilagyi et al., 2000). Complete and accurate parent contact information is essential to the effectiveness of reminder/recall notices; previous studies have found inaccurate parent contact information to be a barrier in certain populations (Daley et al., 2002, 2004; Irigoyen et al., 2006; Kempe et al., 2001; Vivier et al., 2000). This report provides the initial findings from a study conducted to evaluate the completeness and accuracy of parent contact information in a statewide immunization information system

(IIS) and to explore characteristics associated with data quality issues in an effort to identify potential strategies for improvement.

Methods

This observational study was conducted among nine local health departments (LHDs) in southwest Michigan that regularly use the Michigan Care Improvement Registry (MCIR) to conduct reminder/recall notifications. MCIR is populated directly from the state electronic birth certificate system; Michigan law requires that all vaccination doses administered to children <20 years be reported to MCIR (Michigan Department of Community Health, 2009). Notifications were generated by staff at each LHD from January 2008 to May 2009 using MCIR for children living within their respective jurisdictions who were either eligible (reminders) or overdue (recalls) for vaccine doses as recommended by the Advisory Committee on Immunization Practices (ACIP). Each LHD determined the focus of its reminder/recall efforts; collectively, these notices addressed the primary immunization schedule, adolescent vaccinations, and seasonal influenza vaccination. Children were ineligible for notification if a MCIR reminder/recall had been generated within the previous 60 days, or if they had an invalid address field. Envelopes were marked “Return Service Requested” to facilitate the return of undeliverable notifications by the US Postal Service (USPS). This study was approved by the University of Michigan and Michigan Department of Community Health institutional review boards.

The primary outcome was delivery of reminder/recall notification based on the parent (or other responsible party) mailing address in MCIR. Mailed notifications were classified as undeliverable if they were returned by the USPS. Child characteristics included age at the time when the reminders/

Abbreviations: EHR, Electronic health record; LHD, local health department; IIS, immunization information system; ACIP, US Advisory Committee on Immunization Practices; USPS, US Postal Service; WIC, women, infants and children; MCIR, Michigan Care Improvement Registry; GEE, generalized estimating equations; MOGE, moved or gone elsewhere; OR, odds ratio; CI, confidence interval; NCOA, USPS National Change of Address.

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Table 1
Child characteristics of mailed reminder/recall notifications^a.

Characteristics	≤5 Years n = 9664 (%)	11–19 Years n = 10,713 (%)	Total n = 20,377 (%)
<i>Medicaid eligible 2008</i>			
Yes	63.7	25.0	43.3
No	36.3	75.0	56.7
<i>WIC program</i>			
Yes	64.3	–	30.5
No	35.7	100	69.5
<i>Previous vaccine at LHD</i>			
All	3.0	35.6	20.2
Some	29.9	32.2	31.1
None	67.1	32.2	48.7
<i>Notification type</i>			
Reminder	18.9	–	9.0
Recall	81.1	100	91.0

LHD—local health department.

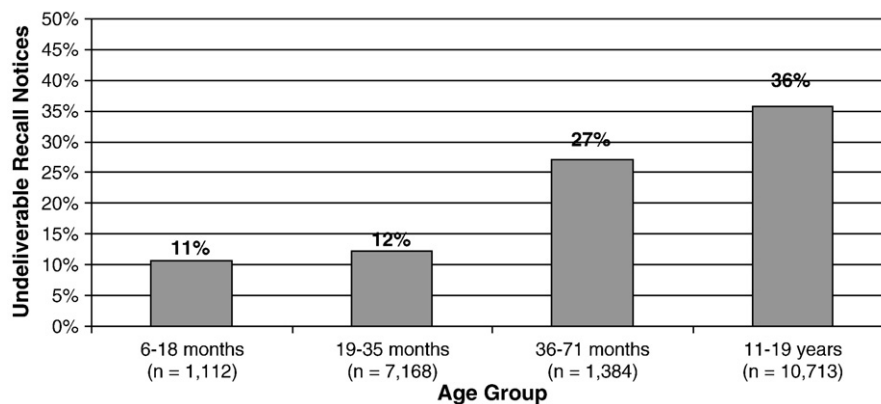
^a Based on the Michigan Care Improvement Registry (MCIR) among participating county local health departments in southwest Michigan, 2008–2009.

recalls were mailed, classified as 6–18 months, 19–35 months, 36–71 months or 11–19 years; LHDs did not conduct reminder/recall for children 6–10 years during the study period. Additional analyses dichotomized child age to compare adolescents (11–19 years) with younger children (≤5 years). MCIR data were examined to determine participation in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) program (ever versus never enrolled) for children ≤5 years, and Medicaid enrollment at any time in 2008 and prior receipt of vaccination doses at an LHD (classified as all, some, or no doses) for all children. Multivariate logistic regression, with generalized estimating equations (GEE) to account for the correlation among children sent more than one notification, was used to model the association between undeliverable notifications and child characteristics. Analyses were conducted with SAS version 9.1.

Results

A total of 20,377 notifications were mailed by LHDs to children eligible for MCIR reminder or recalls. Notifications were nearly evenly distributed between children ≤5 years (47%) and adolescents 11–19 years (53%), but child characteristics varied substantially between age groups (Table 1).

Overall, 26% of notifications ($n = 5186$) were returned as undeliverable. Reminders and recalls were equally likely to be returned as undeliverable; the frequency of undeliverable notifications increased with age and these were most common among adolescents (Fig. 1).

**Fig. 1.** Undeliverable reminder/recall notifications by age of child ($n = 20,377$)^a^aChildren 6–10 years were not notified during the study period by the participating LHDs; based on the Michigan Care Improvement Registry (MCIR) among participating county local health departments in southwest Michigan, 2008–2009.

Compared to children 6–18 months, the odds of an undeliverable notification were higher for children 19–35 months (OR = 1.27; 95% CI: 1.03, 1.56), 36–71 months (OR = 3.03; 95% CI: 2.41, 3.80) and adolescents 11–19 years (OR = 4.94; 95% CI: 4.05, 6.02). Compared to children ≤5 years, adolescents were much more likely to have an undeliverable notification (OR = 3.33; 95% CI: 3.09, 3.58). Children enrolled in Medicaid (OR = 0.76; 95% CI: 0.71, 0.81) or WIC (OR = 0.65, 95% CI: 0.60, 0.69) were less likely than their non-enrolled counterparts to have an undeliverable notification. Children who had previously received some (OR = 1.07; 95% CI: 0.99, 1.15) or all vaccinations (OR = 2.43; 95% CI: 2.25, 2.63) at an LHD were more likely to have an undeliverable notification. In stratified analyses, adolescents had higher odds of an undeliverable notification than children ≤5 years for both the Medicaid (OR = 2.66; 95% CI: 2.38, 2.97) and non-Medicaid (OR = 5.28; 95% CI: 4.64, 6.00) groups.

Discussion

While reminder/recall notifications have been demonstrated to improve immunization rates among children (Centers for Disease Control and Prevention, 2008; Dini et al., 2000; Gaglani et al., 2001; Guide to Community Preventive Services, 2007; Lieu et al., 1998; Szilagyi et al., 2000), inaccurate parent contact information is a substantial barrier to the effectiveness of these efforts, particularly among adolescents. Although prior reports on the accuracy of parent contact information maintained in an IIS are limited to telephone notifications (Daley et al., 2002; Szilagyi et al., 2006; Vivier et al., 2000), mailed recalls generated by private clinics have reported undeliverable rates ranging from 16% to 40% (Daley et al., 2004; Irigoyen et al., 2006). In this study, the likelihood of an undeliverable notification increased with age and was greatest for adolescents. Inaccurate contact data are problematic among adolescents for several reasons. Parent contact information often originates from birth records; over time, there is increasing opportunity for information to become outdated. In addition, the extent to which a child interacts with immunization providers and public assistance programs (e.g., WIC) that monitor vaccination levels is largely age-dependent and may influence the degree to which parent contact information is updated. Given expanded ACIP recommendations (Centers for Disease Control and Prevention, 2011b, c, d) and low vaccination rates among adolescents (Centers for Disease Control and Prevention, 2011a), maintaining accurate parent contact information will be integral to the success of adolescent reminder/recall efforts.

A limitation is that the degree to which MCIR providers updated parent contact information could not be assessed. Ostensibly, the greater frequency of office visits among young children compared

to adolescents provides greater opportunities for providers to update parent contact information in the younger age group; how often this occurs is unknown. In addition, it is possible that some notifications that did not reach the responsible party may have not been returned by the USPS return process, which would yield an underestimate of undeliverable notifications. Finally, the results reported here are based on an observational study of ongoing reminder/recall practices by LHDs; information characterizing the precise reason letters were undeliverable was not available in this study. Additional study is needed to assess the degree to which notices presumed to be delivered were actually received by the intended person.

These findings can inform future interventions aimed at improving IIS contact information, particularly among adolescents. Parent contact information may be available from existing databases such as those maintained by LHDs, state WIC and Medicaid programs, state driver's license bureaus, local Head Start programs, as well as school databases, although privacy considerations would necessitate clear data use agreements between agencies. The national emphasis on adoption of electronic health record (EHR) systems and efforts to improve interoperability between EHRs and immunization registries may foster improved completeness and accuracy of parent contact information available through IIS. LHDs may also consider strengthening procedures to verify contact information as clients check in for immunizations and other services. Other methods to consider include the USPS National Change of Address (<http://www.usps.com/ncsc/addressservices/moveupdate/changeaddress.htm>) process; NCOA data may provide a viable delivery address and therefore minimize undeliverable reminder and recall notifications. Additional study is needed to assess the feasibility of using information from alternate sources to improve IIS reminder/recall notification.

Conflict of interest statement

The authors have no conflicts of interest to disclose.

Acknowledgments

The authors gratefully acknowledge the immunization staff of the participating local health departments in Michigan for their

assistance with reminder/recall notifications, including the Allegan, Berrien, Branch/Hillsdale/St. Joseph, Calhoun, Jackson, Kalamazoo, Kent, Lenawee, and Ottawa County health departments.

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