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Parental and provider preferences and concerns regarding text message reminder/recall for early childhood vaccinations

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ABSTRACT

Objective: To assess parental, provider, and medical staff opinions about text message reminder/recall for early childhood vaccination.

Methods: A cross-sectional survey was conducted between January and March 2011 among 200 parents of 6–59 month-old children, 26 providers, and 20 medical staff at four academically-affiliated pediatric practices in New York City with text messaging experience. Survey questions addressed interest in, preferences for, and concerns/barriers related to vaccine-related text message reminder/recall.

Results: Parents were primarily Latino, Spanish-speaking, and had a high school education or less. Most parents owned a text message-enabled cell phone (89%) and used text messaging services (97%). While 84% had never received health-related text messages, 88% were comfortable receiving them. Nearly all parents reported interest in receiving reminder/recall text messages, many endorsing them over phone calls and/or letters. Preferences included personalization, interactivity, and multiple messages. While 25% of parents had no concerns, 38% were concerned about incorrect numbers; only 6% worried about cost. Providers and staff were also supportive of vaccine-related text messages. Their biggest concerns were correct cell phone numbers, appointment availability, and increased call volume.

Conclusion: Text message reminder/recall for early childhood vaccination was widely supported. Important barriers were identified that should be addressed to maximize their effectiveness.

Introduction

While vaccines are one of the most important public health achievements (Centers for Disease Control and Prevention, 2011c), coverage levels for certain recommended pediatric vaccines fall well below 90% target levels or have declined in recent years (Centers for Disease Control and Prevention, 2011a, 2011b; U.S. Department of Health and Human Services, 2010). Strategies for increasing pediatric vaccination, especially among high-risk low-income minorities, are needed. Reminder/recall has been shown to improve vaccination outcomes, yet is under-utilized (Briss et al., 2000; Clark et al., 2011; Hart et al., 2011; Jacobson and Szilagyi, 2005; Tierney et al., 2003). Moreover, traditional mail and telephone reminder/recall may be less effective for low-income minority families (Daley et al., 2002; Irigoyen et al., 2006; LeBaron et al., 2004); thus, alternative approaches should be considered.

Text message reminder/recall has been identified as a novel, effective strategy for increasing appointment attendance (Downer et al., 2006; Geraghty et al., 2008; Koshy et al., 2008; Leong et al., 2006) and vaccination coverage (Kharbanda et al., 2011; Stockwell et al., 2012a, 2012b). Text messaging has the potential to rapidly identify and reach a large target population since the vast majority of U.S. residents have cell phones, and many use text messaging (CTIA, 2011; Zichuhr and Smith, 2012). Cell phone numbers may also be more stable than landline numbers or home addresses (Clark et al., 2011). Text message reminder/recall could be particularly useful for low-income minorities who are more likely to be cell-only users and use text messaging more than high-income, non-minority individuals (Blumberg et al., 2006; Lee et al., 2012; Smith, 2010a; Zichuhr and Smith, 2012). Conversely, certain low-income minorities (e.g., foreign-born, Spanish-speakers) may be less likely to email or use the Internet (Zichuhr and Smith, 2012). These findings may explain in part why low-income minority families are interested in vaccine reminder/recall via text message (Ahlers-Schmidt et al., 2010, 2011, 2012b; Kharbanda et al., 2009), yet less receptive to reminder/recall via email (Clark et al., 2011).

While understanding parental opinions about text-message vaccine reminder/recall could potentially improve the effectiveness of

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text message interventions, survey studies exploring them have been limited to one community (Ahlers-Schmidt et al., 2010, 2011, 2012b) and not focused on Latino or Spanish-speaking parents. Provider and medical staff support is also crucial, yet data suggest they have concerns about text message reminder/recall (Dombkowski et al., 2012; Hart et al., 2011). Since this could reflect their inexperience using this approach, it may be valuable to elicit input from providers and staff in a setting with text messaging experience.

The present study examines preferences for and potential barriers to adopting text message reminder/recall for early childhood vaccinations among parents, providers, and medical staff in an urban low-income, minority community.

Methods

Study setting

This study was conducted in four academically-affiliated pediatric clinics in New York City. Sites are centrally administered and staffed by one pediatric group practice. During the study period, all sites used automated telephone reminders for existing appointments; vaccine reminder/recall was not routinely used. However, text message reminder/recall interventions were conducted at all sites using a customized text-messaging platform integrated with the registration system and immunization registry for demographic and vaccine information. They targeted *Haemophilus influenzae* B vaccination of young children (January–June 2009) (Stockwell et al., 2012a); human papillomavirus, meningococcal, and tetanus–diphtheria–acellular pertussis vaccination of adolescents (January–June 2009) (Kharbanda et al., 2011; Stockwell et al., 2012a); and influenza vaccination of all children/adolescents (2010–11 season) (Stockwell et al., 2012b).

Study population and recruitment

Parents were eligible for participation if their child was 6–59 months-old and received care at a study site and they were fluent in English or Spanish. Providers and medical staff at these clinics were also eligible for participation. This study was approved by the Columbia University Medical Center Institutional Review Board.

Between January and March 2011, a convenience sample of parents from clinic waiting rooms was approached by a trained research assistant. Of eligible parents approached (n = 213), 200 agreed to participate (94%). A convenience sample of providers and staff was also recruited from those sites during this time. Of all providers (n = 52), 35 were approached (67%) and 26 agreed to participate (16/34 physicians [47%]; 1/2 nurse practitioners [50%]; 9/16 nurses [56%]). Of all staff (n = 43), 25 were approached (n = 58%) and 20 agreed to participate (10/17 medical assistants [59%]; 7/19 receptionists [37%]; 3/7 practice administrators [43%]). After obtaining consent, surveys were administered verbally by the research assistant in English or Spanish.

Survey instruments

Surveys were designed based upon existing literature and expert opinion (Ahlers-Schmidt et al., 2010, 2011; Kharbanda et al., 2009, 2011; Stockwell et al., 2012a, 2012b). Most items were closed-ended with pre-coded responses. Parental survey questions addressed use of ("often", "sometimes", "rarely", "never") and comfort with ("very comfortable", "somewhat comfortable", "somewhat uncomfortable", "very uncomfortable") text messaging, emailing, and Internet browsing in general and about health-related information specifically. The survey also focused on vaccine reminder/recall, including prior experiences, preferences (e.g., modality, content, functionality, timing) and perceived barriers (e.g., cost, cell phone accuracy, privacy). Parents were shown example text messages within the 160-character limit (Fig. 1) (Kharbanda et al., 2011; Stockwell et al., 2012a, 2012b) and asked about intention to act on such messages ("very likely", "somewhat likely", "somewhat unlikely", "very unlikely").

Provider and staff surveys assessed interest in text message reminder/recall: "Do you support or oppose ("very supportive", "somewhat supportive", "somewhat opposed", "very opposed") the idea of using a text messaging system to remind parents to (a) schedule a vaccine appointment; (b) keep a vaccine appointment; and (c) return for missed vaccines in your clinic?". They also addressed potential barriers to implementation (e.g., cost, cell phone accuracy, appointment availability), asking respondents to rate each on a 5-point Likert scale (1 = "no barrier"; 5 = "extremely large barrier"). They then focused on clinic-based changes needed to "facilitate the response to a text messaging reminder/recall system". The provider survey also addressed online health-related communication with families. The staff survey assessed clinic-based practices (e.g., appointment reminders, vaccine walk-in visits). It also asked, "How easy or difficult ("very easy", "somewhat easy", "somewhat difficult", "very difficult") do you think it would be to implement a text messaging reminder/recall system in your clinic?"

A. Chris needs important shots after his 1st birthday. Call 212-345-5758 today for an appointment for his 12-month visit at the Rangel Clinic.

B. Ana is 1 year old! She has an appointment on December 13 at 10am at the Rangel Clinic 212-754-6754. Don't forget to bring her immunization card with you.

C. Jose is due for shots. Come to the Rangel Clinic Mon-Thu 9-11am, Fri 1-3:30pm. Vaccines will help keep Jose healthy.

Fig. 1. Vaccine-related text message examples. This text message, adapted from prior vaccine text-messaging studies (Kharbanda et al., 2011; Stockwell et al., 2012a, 2012b), was displayed to parents during survey administration. Parents were then asked how likely they would be to act on this message to a) schedule an appointment for vaccines; b) keep an existing appointment for vaccines, or c) bring in their child for a missed vaccine.

Statistical analysis

Survey responses were described using frequency distributions. Chi-square and Fisher's Exact tests examined the association between parental demographic characteristics and frequency of and comfort with texting, emailing, or Internet browsing in general and about health-related information specifically. Multivariable logistic regression assessed predictors of parental general technology use. Analyses were performed using SAS Version 9.2 (Cary, NC).

Results

Parents were predominantly Latino, foreign-born, and unemployed (Table 1). Parental age ranged between 16 and 56 years (median: 29 years). The vast majority (96%) reported a good or excellent ability to read in their preferred language (52% English, 48% Spanish). Almost all parents (97%) stated that their children were publicly insured.

Most providers and staff were female (n = 43, 93%) aged 25–44 years (n = 25, 56%). Providers included attending physicians (n = 16, 62%), nurse practitioners (n = 1, 4%), and nurses (n = 9, 35%). Staff included medical assistants (n = 10, 50%), receptionists (n = 7, 35%), and practice administrators (n = 3, 15%).

Parental experiences and comfort with text messaging and other technology

Most parents (89%) owned a cell phone with text messaging capabilities. Of these, the vast majority (85%) had unlimited messaging plans. In total, 91% had sent and 97% had received at least one text message. Of these, 96% texted at least once/month (median 100 messages/month). Most parents also reported frequent emailing or Internet browsing. On multivariable analysis, younger age was associated with text-messaging, higher education was associated with emailing, and English preference was associated with text-messaging, emailing, and Internet browsing (Table 1).

The majority of parents had neither sent (96%) nor received (84%) health-related text messages. Most had also never emailed with a provider (90%) or browsed the Internet (75%) about health-related issues. Nonetheless, most reported feeling somewhat or very comfortable receiving text messages (88%), emailing with a provider (84%), or Internet browsing (87%) about health-related issues. Parents who preferred English were more comfortable than those who preferred Spanish with health-related text messaging (99% vs. 91%, $p < 0.05$), emailing (98% vs. 91%, $p < 0.05$), and Internet browsing

Table 1
General technology use[a] according to parental characteristics (n = 200) (New York City, 2011).

Parental characteristic	Total	Type of Technology								
		Text messaging[a]			Emailing[a]			Internet browsing[a]		
	% (n)	% (n)	*p* value	AOR (95% CI)	% (n)	*p* value	AOR (95% CI)	% (n)	*p* value	AOR (95% CI)
All		84 (168)			76 (151)			79 (157)		
Age (yr)[b]										
≥29 years	51 (102)	77 (79)	0.01	REF	71 (72)	0.10	REF	75 (76)	0.16	REF
<29 years	49 (98)	91 (89)		2.58 (1.07, 6.19)	81 (79)		1.53 (0.75, 3.15)	83 (81)		1.36 (0.65, 2.87)
Country of birth										
U.S.-born	37 (73)	95 (69)	<0.01	N/A[c]	89 (65)	<0.001	N/A[c]	93 (68)	<0.001	N/A[c]
Foreign-born	63 (127)	78 (99)		N/A	68 (86)		N/A	70 (89)		N/A
Race/ethnicity										
Latino	85 (170)	84 (142)	0.82	N/A[d]	76 (129)	0.75	N/A[d]	78 (132)	0.93	N/A[d]
Non-Latino Black	11 (23)	83 (19)		N/A	70 (16)		N/A	83 (19)		N/A
Non-Latino White/other	4 (7)	100 (7)		N/A	86 (6)		N/A	86 (6)		N/A
Education										
≤ High school	52 (105)	78 (82)	0.02	REF	66 (69)	<0.001	REF	71 (75)	0.01	REF
> High school	48 (95)	91 (86)		1.82 (0.73, 4.51)	86 (82)		2.24 (1.04, 4.85)	86 (82)		1.55 (0.70, 3.43)
Language preference[e]										
Spanish	48 (95)	74 (70)	<0.001	REF	61 (58)	<0.001	REF	64 (61)	<0.001	REF
English	52 (105)	93 (98)		3.55 (1.38, 9.14)	89 (93)		3.59 (1.67, 7.73)	91 (96)		4.71 (2.04, 10.89)
Employment										
Full time	23 (46)	93 (43)	0.02	REF	87 (40)	0.02	REF	89 (41)	0.03	REF
Part time	15 (30)	93 (28)		0.98 (0.14, 6.71)	87 (26)		1.07 (0.25, 4.47)	87 (26)		0.85 (0.19, 3.70)
Unemployed	62 (124)	78 (97)		0.34 (0.09, 1.23)	69 (85)		0.45 (0.17, 1.22)	73 (90)		0.44 (0.15, 1.26)

[a] Defined as "sometimes" or "often" in response to the question, "How frequently do you use [use text messaging services, use email, or browse the Internet]?".
[b] The median age of the study population was 29 years.
[c] Since language preference and country of origin were associated ($p < 0.001$), only language was included in the multivariable logistic regression models.
[d] Since subjects were predominantly Latino and race/ethnicity was not significantly associated with technology use on bivariate analysis, this variable was not included in the multivariable logistic regression models.
[e] Language that parent reported feeling most comfortable reading.

(99% vs. 88%, $p < 0.01$). U.S.-born parents were more comfortable with health-related Internet use than foreign-born parents (100% vs. 90%, $p < 0.01$).

Parental experiences with and beliefs about reminder/recall

Few parents reported ever receiving a reminder to schedule an appointment (19%) or that their child needed a vaccine (25%). Prior appointment reminders were mostly written (e.g., letters) (76%); only 5% were text messages. Despite routine use of automated telephone reminders, only 3% of parents reported receiving one. Prior vaccine reminders varied in format: written (27%), telephone (22%), text messages (31%), or other (31%). Parents most preferred text message reminders (48%), followed by phone calls from clinic staff (32%), letters (16%), and automated calls (4%). Almost all parents (96%) were somewhat or very interested in receiving text message vaccine reminders and reported that, in response to receiving a text message, they would be very likely to schedule a vaccine appointment (94%), keep an existing vaccine appointment (97%), or bring their child in for a missed vaccine (96%).

Parents expressed interest in incorporating many patient, provider, visit, and vaccine-related details in the text messages (Table 2). Many also endorsed text message interactivity and felt that more than one message should be sent, preferably in the afternoon (Table 3). Parents were most concerned about cell phone number accuracy and privacy; few worried about cost (Fig. 2).

Provider and staff experiences with and beliefs about text messaging reminder/recall

Most providers were supportive of using text messaging to remind parents to schedule a vaccine appointment (88%), keep an existing appointment (92%), and return for missed vaccines (88%). Similarly, the majority (>95%) of medical staff were supportive of text message reminder/recall. Of note, 54% of providers reported communicating online with parents about their child's medical care. Of these, 14% did so often, 29% sometimes, and 57% rarely.

Providers and staff were most concerned about cell phone number accuracy, while few worried about cost (Fig. 3). The majority of staff (60%) thought that it would be somewhat or very easy to implement this system at practice sites. All providers (100%) and most staff (80%), however, thought increased staffing would be necessary to answer calls to schedule appointments in response to text message reminder/recall. Most providers (62%) preferred that children with overdue vaccines come for walk-in visits rather than scheduled appointments, yet fewer providers (38%) and staff (45%) thought walk-in hours should be increased. Only 52% of providers thought information about needed vaccines should be sent to parents.

Discussion

This study demonstrates strong support of text message reminder/recall for early childhood vaccination in a clinical setting with use of this novel approach. This study also reveals strategies for tailoring

Table 2
Parental preferences (n = 200) for content of reminder/recall text messages (New York City, 2011).

Text message content	Text message type		
	Reminder to schedule appointment, % (n)	Reminder to attend appointment, % (n)	Vaccine recall, % (n)
Child name	98 (196)	97 (194)	97 (194)
Child date of birth	71 (141)	69 (137)	71 (142)
Provider name	85 (169)	85 (169)	86 (171)
Clinic name	89 (177)	86 (172)	87 (173)
Clinic address	67 (134)	70 (140)	71 (141)
Clinic phone #	91 (181)	91 (181)	92 (183)
Visit type	96 (192)	NA	92 (183)
Appointment date	NA	99.5 (199)	NA
Appointment time	NA	99.5 (199)	NA
Visit time period	93 (185)	NA	92 (183)
Vaccines needed	93 (185)	NA	94 (187)

Table 3
Parental preferences (n = 200) for features of reminder/recall text messages (New York City, 2011).

	% (n)
Interactivity	83 (165)
Text back appointment scheduled[a]	98 (161)
Text back vaccine received[a]	96 (159)
Receive vaccine-specific information[a]	93 (153)
Request help[a]	90 (149)
Obtain personal vaccine information[a]	88 (146)
Switch languages[a]	70 (116)
Discontinue reminders[a]	49 (81)
Reminders to schedule appointment	
>1 message	59 (117)
Duration between messages[b]	
Few days	59 (69)
One week	32 (37)
Other[c]	9 (10)
Reminders to attend appointment	
>1 message	61 (122)
Timing of message(s)	
Few days before appointment	58 (114)
One week before appointment	36 (72)
Other[d]	6 (12)
Vaccine recalls	
>1 message	97 (193)
Duration between messages[b]	
Few days	71 (136)
One week	21 (41)
Other[c]	8 (16)
Time of day	
Afternoon	95 (190)
Weekend	87 (173)
Morning	85 (170)
Evening	83 (165)

[a] Interactive functions supported by parents in favor of text messaging interactivity overall.
[b] Suggested duration between messages by parents preferring that >1 message be sent.
[c] Note: missing data for one subject.
[d] Note: missing data for two subjects.

messages to parental needs while identifying potential barriers to successful implementation. These should be considered when optimizing text message reminder/recall to promote pediatric vaccination, especially for low-income minorities who may be less responsive to traditional reminders—as potentially evidenced here by parental lack of awareness that telephone appointment reminders were sent to them—and other novel approaches such as email reminders.

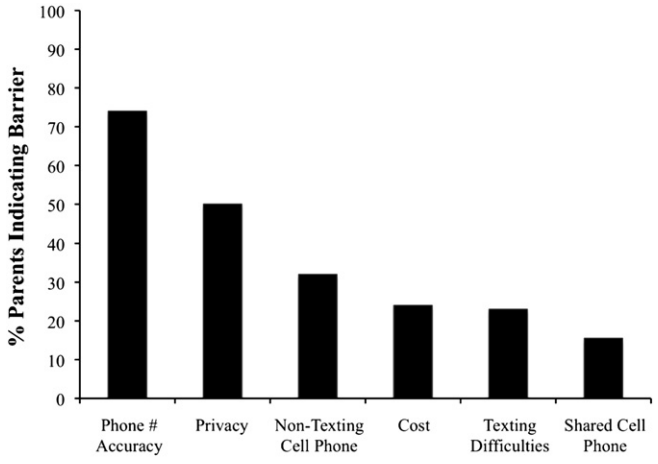

Fig. 2. Parental perceived barriers to text message reminder/recall. The proportion of parents (n = 200) reporting a potential barrier to receiving text message reminder/recall (New York City, 2011).

The vast majority of parents were comfortable with health-related text messaging and supportive of receiving vaccine reminder/recall text messages. Many also preferred text message to email vaccine reminder/recall, indicating that text messaging is a promising modality for reaching these families. These findings differ from national data showing that parents prefer more traditional approaches (Clark et al., 2011). This could reflect prior experience receiving text message vaccine reminders (i.e., 8% of our subjects vs. 0% of national sample). Age could also contribute since most of our subjects were young, and the national study found that younger parents preferred cell phone reminders, while older parents preferred email (Clark et al., 2011). Moreover, nearly all of our parents, like other low-income minorities (Ahlers-Schmidt et al., 2010; Smith, 2010a; Zichuhr and Smith, 2012), had cell phones with text messaging capabilities. More parents used text messaging than email or the Internet, especially those who were foreign-born or preferred Spanish, which is also consistent with prior studies (Smith, 2010b; Zichuhr and Smith, 2012). It is unclear how these findings may change with technological advances. For example, younger low-income minority populations may be more likely to access the Internet and interact with technology via smart phone (Fox, 2011; Zichuhr and Smith, 2012). Using email communication via smart phone as a reminder/recall modality could address certain text messaging limitations, although studies have found inconclusive evidence supporting email communication between providers and adult patients (Atherton et al., 2012a, 2012b; Sawmynaden et al., 2012).

In order to develop an effective vaccine text message reminder/recall system, parental preferences for content and features must be fully understood and taken into consideration. Parents in this study suggested including child, provider, clinic, and vaccine-specific information, which is consistent with evidence that parents prefer personalized messages (Ahlers-Schmidt et al., 2011, 2012b; Kharbanda et al., 2009). However, privacy issues were also mentioned. Moreover, text message content is limited to, at most, 160 characters (Dombkowski et al., 2012). Although much information can be included in messages, as illustrated in Fig. 1, interactive features may permit even greater information exchange between parents and providers or practices. Interactivity is readily available with automated phone reminder systems. It is also offered with text message reminders by some commercial vendors (Dombkowski et al., 2012) and may become more routine as text-messaging systems become more common. To date, studies have not assessed parental attitudes about using interactivity to tailor the messaging system. Parents here strongly supported its use.

Providers and staff in this study were also supportive of text message reminder/recall, which is important given their familiarity with this system, particularly downstream effects following deployment (Kharbanda et al., 2011; Stockwell et al., 2012a, 2012b). Nonetheless, provider support was modestly lower than for parents (88–92% vs. 96%), and 40% of staff thought it would be difficult to implement this system. Low provider acceptance and practice personnel concerns have been demonstrated previously (Dombkowski et al., 2012; Hart et al., 2011). This could relate to challenges such as appointment availability or increased patient volume. These could be met in part by using existing infrastructure, including designated walk-in times for vaccination.

Cell phone accuracy was also a concern. Prior studies have found a variable proportion of undeliverable text messages, from 0.4 to 11.1% in our population (Kharbanda et al., 2011; Stockwell et al., 2012a, 2012b) to 40% elsewhere (Ahlers-Schmidt et al., 2012a). Comparatively, a recent study revealed that 26% of reminder/recall letters were returned as "undeliverable" (Dombkowski et al., 2011). National data suggest that cell phone numbers may be more stable than other contact information such as addresses and landlines (Clark et al., 2011). Nonetheless, efforts to update contact information should be made at all health care encounters. Interestingly, few parents in the present study, unlike prior studies (Ahlers-Schmidt et al., 2010; Clark et al., 2011), were concerned about the cost of receiving messages. This likely reflects the fact that most participants had unlimited

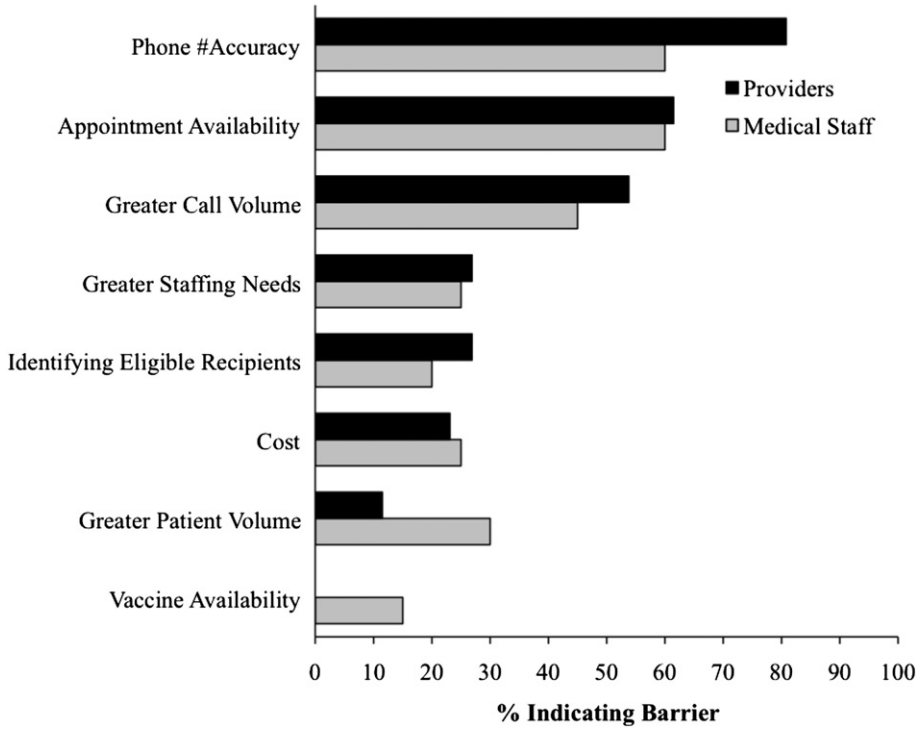

Fig. 3. Perceived barriers to text message reminder/recall. The proportion of providers (n = 26) and medical staff (n = 20) who reported each potential barrier to successful implementation of text message reminder/recall in their practice (New York City, 2011).

plans. Similarly, few providers or staff reported cost as a potential barrier to successful implementation. This differs from that described in other practices (Dombkowski et al., 2012), perhaps because our providers and staff had limited knowledge of the costs associated with the customized text-messaging platform. They were also not asked to specify where costs would be borne. Most practices likely would not create their own system, but use a commercial vendor offering text message reminders (Dombkowski et al., 2012). The cost of integrating this system with the practice registration and immunization databases, like other challenges that may arise, should be similar to that of a traditional reminder system.

This study has some limitations. While survey administration at sites familiar with text message vaccine reminder/recall is important, the findings may not be generalizable to all populations and practice settings. Further, this study used convenience sampling so opinions may not be representative of the entire clinic population, although demographic characteristics were comparable. Additionally, while parents suggested including more information in text messages, they were not asked to prioritize content. This may be useful given existing character limits. Moreover, parents reported strong intentions to act on reminder/recall messages; however, actual behaviors were not assessed. While not all intentions correlate with actual behaviors, previous studies indicate that many individuals do act in accordance with vaccine-related text messages (Kharbanda et al., 2011; Stockwell et al., 2012a, 2012b).

Conclusion

This study illustrates the continued support of text message reminder/recall interventions in a setting with experience using them. It also identifies key parental preferences, including the use of personalized, detailed, and interactive vaccine text messages, and offers insight into potential barriers to implementation of this novel approach, which may be valuable when deploying text message reminder/recall in similar settings using either a local platform or commercial vendor.

Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Conflict of interest statement

Since July 1, 2012, Dr. Hofstetter has received some salary support from a Merck Investigator Studies Program grant for a study of HPV vaccination in adolescent and young adult females. The other authors have no conflict of interests or financial disclosures to report.

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