



Original article

Effects of Phone and Text Message Reminders on Completion of the Human Papillomavirus Vaccine Series



Cynthia M. Rand, M.D., M.P.H.^{a,*}, Phyllis Vincelli^a, Nicolas P. N. Goldstein^a, Aaron Blumkin, M.S.^a, and Peter G. Szilagyi, M.D., M.P.H.^b

^a Department of Pediatrics, University of Rochester School of Medicine and Dentistry, Rochester, New York

^b Department of Pediatrics, Mattel Children's Hospital, University of California Los Angeles (UCLA), Los Angeles, California

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ABSTRACT

Purpose: To assess the effect of phone or text message reminders to parents of adolescents on human papillomavirus (HPV) vaccine series completion in Rochester, NY.

Methods: We performed parallel randomized controlled trials of phone and text reminders for HPV vaccine for parents of 11- to 17-year olds in three urban primary care clinics. The main outcome measures were time to receipt of the third dose of HPV vaccine and HPV vaccination rates.

Results: We enrolled 178 phone intervention (180 control) and 191 text intervention (200 control) participants. In multivariate survival analysis controlling for gender, age, practice, insurance, race, and ethnicity, the time from enrollment to receipt of the third HPV dose for those receiving a phone reminder compared with controls was not significant overall (hazard ratio [HR] = 1.30, $p = .12$) but was for those enrolling at dose 1 (HR = 1.91, $p = .007$). There was a significant difference in those receiving a text reminder compared with controls (HR = 2.34, $p < .0001$; an average of 71 days earlier). At the end of the study, 48% of phone intervention versus 40% of phone control ($p = .34$), and 49% of text intervention versus 30% of text control ($p = .001$) adolescents had received 3 HPV vaccine doses.

Conclusions: In this urban population of parents of adolescents, text message reminders for HPV vaccine completion for those who had already started the series were effective, whereas phone message reminders were only effective for those enrolled at dose 1.

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IMPLICATIONS AND CONTRIBUTION

In this pair of randomized controlled trials in an urban sample of parents who chose their reminder method (text or phone), text reminders for human papillomavirus vaccination significantly decreased the adolescents' time to receipt of subsequent human papillomavirus vaccination, whereas phone reminders were only effective for those enrolled at dose 1.

Human papillomavirus (HPV) causes most cases of cervical cancer, as well as a large proportion of vaginal, vulvar, anal, penile, and oropharyngeal cancers, in addition to genital warts and respiratory papillomatosis. An estimated 79 million people in the United States are infected with HPV, with an estimated 14 million new infections occurring each year in individuals aged

15–59 years [1]. Despite the vaccine being available for almost a decade, HPV vaccination rates across the United States remain low. In 2014, only 39.7% of girls and 21.6% of boys (aged 13–17 years) received three doses [2]. Furthermore, rates of completion for those who started the series are lower for black adolescents [2]. Completion of the HPV vaccine series is important to protect adolescents against the most common HPV types associated with cervical and oropharyngeal cancer as well as genital warts before they are exposed to the virus. The challenges of initiating HPV vaccination are distinct from the challenges of completing the series: parents who are hesitant about HPV vaccine will be concerned about initiation; whereas access and other barriers may be

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* Address correspondence to: Cynthia M. Rand, M.D., M.P.H., University of Rochester Medical Center, 601 Elmwood Avenue, Box 777, Rochester, NY 14642. E-mail address: Cynthia_Rand@urmc.rochester.edu (C.M. Rand).

a more important factor in completion of the three dose series. Most adolescents have few visits to their primary care provider, and rates of annual well child care for this age group are low, particularly for older adolescents [3,4]; reminders for preventive care have the potential to decrease this gap. In addition, many parents are unaware of the need for three doses of the vaccine [5].

One general strategy recommended by the Task Force on Community Preventive Services for any immunization is patient (parent) reminder recall, to increase demand for the vaccine [6]. In addition, reminders provide the “self-management support” recommended to improve the delivery of effective preventive care [7]. Reminder-recall systems have been found to be generally effective in multiple settings—including private practices, academic hospital affiliated clinics, and public health organizations—to improve childhood and adolescent immunization rates [8–10]. Multiple reminder methods have been shown to be effective, including mail, telephone, and autodialer. However, the complication of frequently changing landline phone numbers for urban patients has made implementation of telephone reminders challenging [9]. More recently, text message reminders have been found to be effective for influenza, [11] Tdap, and meningococcal vaccinations [12] in one University-affiliated setting. As communication methods change over time, it is unclear what method of vaccine reminder is currently best for parents of adolescents.

Only a few studies have examined practice-based reminders specifically for HPV vaccination and results have varied. Educational reminders to parents in suburban Philadelphia practices improved rates of HPV doses 2 (6% increase) and 3 (11% increase) more than dose 1 (2% increase) [13]. Another study of practices in New York City found that adolescents whose parents received a text message reminder had higher rates of HPV vaccination compared with unenrolled parents and historical controls (51.6% vs 35%) [14], and reminder letters improved series completion (56.4% in intervention vs 46.6% of controls) for adolescent females in a Southern California health plan [15], and in private practices in Denver, CO (26.5% intervention vs 15.3% control) [16]. However, a study of HPV vaccination reminders for young adult women who attended reproductive health centers did not increase vaccine completion (18.9% intervention vs 17.2% control completed series) [17], nor did a study of text or email appointment reminders for college students (34% vs 32% completion) [18]. It remains unclear which methods of reminders are best for ensuring that adolescents complete the HPV vaccine series.

Newer research highlights that patient preferences should be considered in many interventions [19]. While cell phones have become ubiquitous in the United States (90% of American adults owned a cell phone in 2014) [20], not all parents prefer text message reminders for vaccination [19]; young parents prefer text messages, but many parents remain in favor of traditional telephone reminders, as our prior interviews have shown [21]. The purpose of this study was to assess the effect of telephone and text reminders (per parental preference) on HPV vaccination completion for those adolescents who have already started the HPV vaccine series.

Methods

Study design

We performed two parallel, two-arm randomized controlled trials of (1) telephone reminders versus standard of care controls and (2) text reminders versus standard of care controls on receipt

of doses 2 and 3 of HPV vaccine among adolescents who had received their first HPV vaccine.

Sample and setting

This study was conducted in three urban primary care clinics (pediatric, medicine pediatric, and family medicine) in Rochester, NY. Patients aged 11–17 years old were recruited from April 2012 to December 2013. All practices were affiliated with a hospital-based practice that served as training sites for residents. The University of Rochester Medical Center Institutional Review Board approved the study. A sample size of 169 per intervention arm was sufficient to detect a 15% increase in vaccination rates from reminders with an alpha of .05, power of 80% and a conservative estimate of 50% for the vaccination rate.

Recruitment, randomization, and intervention

Parents of adolescents receiving an HPV vaccine filled out a consent form at the time of the first or second HPV vaccine dose, indicating which method they would prefer for a vaccine reminder (telephone or text message), and giving permission for review of the adolescent's HPV vaccine records. They were told that the reminder would only be sent only if they were in the intervention group. Adolescents filled out a consent form to have their chart reviewed for HPV vaccine dosing. After consenting, patients in each reminder preference group were randomized to receive a reminder (intervention) or usual care (control). Participants were randomized in a blocked format, and the analyst was blinded to individual group assignment. A maximum of three successful reminders for each dose due (1 week apart) was sent to parents in the phone and text intervention groups, using the TeleVox communication system (Televox Software, Mobile, AL), which reported whether messages had been delivered successfully. If messages were not successful, up to six attempts were made to reach the participant. The phone message stated “Hello, this is a reminder message that your xx-year old is due for their next HPV vaccination. Please call xxx-xxxx to schedule your appointment. If you have already done so, please disregard this message.” The text message was shortened to “Reminder your xx-year-old child is due for their next HPV vaccine. Call xxx-xxxx to schedule. If you have already done so, please ignore this message.” Reminders continued if a patient had not yet completed the vaccine series through April 2014.

Analyses

The main outcome measures were time from enrollment to receipt of the second and third doses of the HPV vaccine (accounting for doses at enrollment), using an intent-to-treat analytic strategy for each randomized controlled trial. Kaplan-Meier failure curves were created for phone reminders compared with control and text reminders compared with control. Observations were censored if participants withdrew from the study or at the end of follow-up. Significance was assessed using the log-rank test. Cox proportional cumulative hazard models were created for phone reminders versus control and text reminders versus control, with covariates including gender, age, practice, insurance, race, and ethnicity. The assumption of proportional hazards was tested for both models. Secondary analysis included rate of HPV vaccination (dose 1, 2, and 3) at the end of the study period. Chi-square tests were used to assess baseline demographic

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