

Interventions to Improve Adolescent Vaccination What May Work and What Still Needs to Be Tested



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ABSTRACT

Since the development of the “adolescent platform” of vaccination in 1997, hundreds of studies have been conducted, identifying barriers to and facilitators of adolescent vaccination. More recent research has focused on developing and evaluating interventions to increase uptake of adolescent vaccines. This review describes a selection of recent intervention studies for increasing adolescent vaccination, divided into three categories: those with promising results that may warrant more widespread implementation, those with mixed results requiring more research, and those with proven effectiveness in other domains that have not yet been tested with regard to adolescent vaccination.

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1. Introduction

Vaccination is a cornerstone of adolescent preventive care in the U.S. Since the introduction of routine vaccination during childhood and adolescents, it is estimated that more than 732,000 deaths and more than 21 million hospitalizations have been averted in the U.S. alone over the last 20 years as a result of the prevention of diseases by vaccines [1]. Though these successes are to be celebrated, there is still much work to be done. In fact, 2011 marked the beginning of the “decade of vaccines” in recognition of the need for efforts to expand vaccine coverage in regions of the world with low vaccine access, and to continue, and even strengthen, efforts to maintain high coverage in other areas where vaccine hesitancy and complacency have undermined vaccination efforts [2].

Over the last decade, increased recognition that adolescents are an important reservoir of several vaccine-preventable diseases has increased attention on vaccination of this age group specifically. For example, the highest proportion of pertussis cases occurs among 11–18-year-olds [3], ~75% of new HPV infections occur in 15–24-year-olds [4], and 13–21-year-olds have the highest incidence of meningococcal disease outside of infancy [5]. These illnesses can affect entire communities, making adolescent vaccination against these infections a major public health priority. The “adolescent platform” of vaccines was initially developed in 1997 with recommendations for adolescent varicella, hepatitis B, tetanus, and measles–mumps–rubella [6]. Over time, the

vaccines comprising the adolescent platform have changed to reflect changes in the vaccination schedule. Currently, the platform consists of four vaccines routinely recommended for all U.S. adolescents [7]: the tetanus–diphtheria–acellular pertussis (Tdap); meningococcal (MCV); human papillomavirus (HPV); and influenza vaccines. With the exception of annual influenza vaccination, all of these vaccines are preferentially recommended for 11–12-year-olds, but can be given throughout adolescence if not provided previously [8].

Of these four vaccines, only Tdap and MCV have surpassed or nearly reached the U.S. Healthy People 2020 goal coverage level of 80%. As of 2013, Tdap uptake among those aged 13–17 years was 86.0% and MCV was 77.8% [9]. HPV vaccination levels lag significantly, with only 57.3% of girls and 34.6% of boys aged 13–17 having begun the three-dose series. Series completion is significantly lower, at 37.6% and 13.9% for girls and boys, respectively. Of concern, among girls there have been minimal increases in HPV vaccination over the last 3 years [10]. Influenza vaccination is also dismally low, with only 42.5% of adolescents receiving this vaccine in the 2012–2013 season [11].

Since the development of the adolescent platform, there have been hundreds of studies [12–23] describing the variety of barriers to vaccinating this population. This work has laid the foundation for more recent research [24–26] aimed at developing and evaluating interventions to increase adolescent vaccination. These studies have centered primarily on HPV and influenza vaccines, given their lower coverage levels. This review focuses on a selection of recent (from 2006 to present) intervention studies for improving adolescent vaccination. It includes select examples from three levels of possible intervention: parents/patients, practice, and population (Fig. 1). This review specifically focuses on interventions

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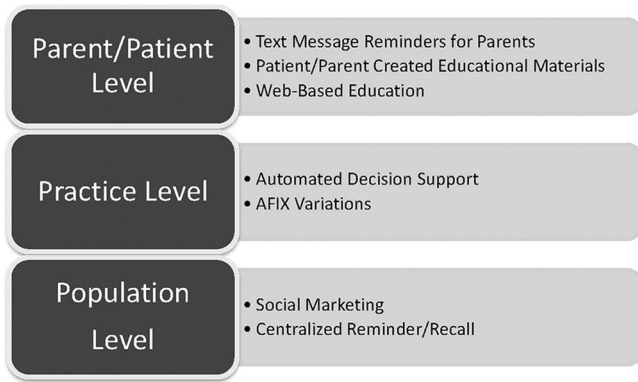


Fig. 1. Tested interventions that hold promise for increasing adolescent vaccination.

Note: Potentially useful adolescent vaccination interventions discussed in this review, sub-divided by the level at which the intervention occurs.

that, in our opinion, go beyond the “usual suspects” in that they are either entirely novel, have had little prior examination, or add a twist (usually technology-related) to the standard evidence-based interventions for vaccination recommended by the U.S. Task Force on Community Preventive Services (USTFCPS) [27,28]. As this is not a systematic or comprehensive review, studies related to school mandates for vaccines are not included because policy interventions such as this are outside of the scope of this manuscript. Also not included are studies focused on the provision of vaccines in schools, for example, through school-located clinics, as this large and diverse subject potentially warrants its own review.

2. Tested Interventions That Hold Promise for Increasing Adolescent Vaccination

The studies described below represent a selection of interventions that appear to be potentially useful for increasing adolescent vaccination. Many of these interventions use technology to support their implementation.

2.1. Parent/Patient-Level Interventions

2.1.1. Text messaging to parents

Parent and clinician “reminders” for vaccines coming due, and “recall” for vaccines past due, are one of several evidence-based approaches for improving vaccination endorsed by the USTFCPS [27]. Most studies of this communication strategy have focused on paper- or telephone-based reminder systems. However, with the increased use of mobile phones for health-related activities [29], several groups have recently begun to examine the impact of text message reminder/recall on adolescent immunization. Kharbanda et al. [30] examined the impact of text message reminders for on-time receipt of first and second doses of HPV vaccine among parents of adolescents (aged 9–20 years) from nine pediatric sites in New York City. After controlling for variations in insurance and intervention implementation, adolescents of the 124 parents enrolled in the text messaging program had approximately two times the odds of receiving HPV doses on time when compared with controls. Subsequent studies found similar effects for MCV and Tdap vaccines (AORs among intervention group, 2.17–4.57, depending on the assessment time and vaccine) [31]. Moreover, in a significantly larger study [32] ($n = 3,790$ intervention, $n = 3,784$ control), effectiveness of text messaging for improving influenza vaccination was also demonstrated (relative rate ratio = 1.09 for intervention vs control), though these analyses included children

aged 6 months to 18 years and did not provide adolescent-specific results. Other groups [33–38] are engaged in text messaging studies for adolescents or other populations, and it appears that a systematic review [39] on this approach will be forthcoming. Based on these studies, the use of text messaging to improve adolescent vaccination, particularly the completion of multi-dose series, seems promising.

2.1.2. Parent/patient-created educational materials

Patient- or parent-based education, when used without other intervention strategies, is deemed by USTFCPS as an approach with “insufficient evidence” to endorse as a strategy to improve vaccination rates [28]. However, these analyses were done primarily before newer educational modalities were used—for example, using community input to design the educational materials (i.e., creation of “patient-centered” information), or web-based tools for information dissemination.

Recently, there has been a push in health communication toward making educational materials more “patient-centered” [40–42]. Patient-centeredness refers to the notion that input from the expected “end users” (in this case adolescent patients/parents) into the development of an intervention can significantly improve its acceptability and effectiveness [42]. A few studies have begun exploring patient-centered approaches to developing educational materials related to adolescent vaccination. Gargano and colleagues [43] described the development and evaluation of a parent educational brochure about adolescent vaccines that was created in close collaboration with focus group and pilot testing feedback from parents of middle and high school students where the intervention was to be implemented. Overall, 67% of parents recalled receiving the brochure, 90% of whom read it. Moreover, more than half discussed the brochure with family or friends. The authors of this study indicate that future work will evaluate the impact of the intervention on actual adolescent vaccination levels.

A second study by Katz et al. [44] described the development of a comic book that included critical input by parents in rural Ohio as part of a multilevel intervention to promote HPV vaccination. Using an iterative approach, parents and the research team collaboratively created a storyline, text, and artistic elements that were developed into a comic book. When the comic book was evaluated among 20 additional parents, it significantly improved their knowledge and positive attitudes about HPV vaccination. Moreover, among the 19 adolescents whose parents gave permission for them to also read the book, most had positive responses to the materials and indicated that the format and information were useful and engaging. Future studies by this group will examine the impact of the comic book on adolescent attitudes and utilization of the vaccine among a larger sample.

2.1.3. Web-based educational materials for parents

Web-based approaches to health communication have been studied in many domains [45–52]. A few groups have examined this communication modality with regard to adolescent vaccination specifically. Starling and colleagues [53] developed a website called “GoHealthyGirls” to educate and inform parents and their adolescent daughters about HPV vaccines and infection. Beta-testing of this multimedia website among a diverse set of 63 parents and their daughters demonstrated that, after viewing the website, parents reported significantly more-positive attitudes about HPV vaccination, and higher perceived risk for HPV infection. The authors report that this website will be more thoroughly evaluated in an upcoming RCT.

Another approach that has begun to be evaluated with regard to adolescent vaccination is whether websites providing parents with “tailored” information about vaccines influence vaccine uptake. Message tailoring involves the individualization of educational

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