Using Immunization Information Systems and Electronic Health Records to Improve HPV Immunization Rates: Facilitators and Barriers to “Making It Work” In Practice

A Review of the Literature

By Sara Jaye Sanford, MPH – WithinReach
For the National HPV Vaccination Roundtable
September 2016

Introduction & Methods

The purpose of this literature review is to assess the published literature describing barriers and facilitators to increasing HPV immunization rates using immunization information systems (IIS) and electronic health records (EHR). It was commissioned by the EHR/IIS Task Group of the National HPV Vaccination Roundtable (Task Group) over the summer of 2016 to inform overall strategies in using these health information technology tools to improve HPV immunization rates.

Potential studies were identified using a combination of the following search terms: “HPV,” “vaccination,” “immunization,” “registry,” “electronic health records,” and “electronic medical records” in PubMed. However, upon review and further discussion with the Task Group, it became clear that literature documenting not only the relative success of interventions on HPV vaccination rates, but rather the specific qualities of EHR and IIS and their use that supported or impeded successful intervention implementation, was of greater interest. Additionally, it was decided that specific reference to HPV was not necessary as an exclusion criterion, as these barriers and facilitators are likely to be relevant to all recommended immunizations. Search results were screened to determine whether they identified particular barriers and/or facilitators to success within IIS and EHR. Out of 25 studies originally identified through these search methods and deemed relevant, 7 met this criterion and are included in this review.

Additional sources were identified by reviewing and searching the grey literature of relevant organizations, such as the Centers for Disease Control and Prevention and the American Immunization Registry Association. Grey literature refers to material published by government, academia, businesses, and other organizations not controlled by commercial publishing (i.e., not in the peer-reviewed journals available through databases such as PubMed).

Research results produced a limited body of literature addressing these more practical aspects of successfully using IIS and EHR to improve HPV vaccination rates. One recent systematic review of using IIS to improve immunization rates comments that:

“Few studies provided information relevant to an assessment of the utility of IIS for vaccination providers in clinical settings. Descriptions, assessments, and evaluations focused on the utility of, or barriers to, the use of IIS in day-to-day operations of vaccination providers in a range of clinical settings would provide important information to help determine the overall value of
these interventions and identify tools, interactions, and reporting policies in need of adjustment or modification.”

Regarding using provider prompts, another systematic review on improving HPV immunization rates noted that “[t]here was a consistent lack of reporting implementation barriers common to all decision support interventions, information that would be useful to guide future interventions.” Hopefully, future research will provide further guidance to fill the gap on how to implement these established best practices to optimize their effectiveness.

Available evidence identified in this review is described below.

Evidence-Based Practices for Improving HPV Immunization Rates Using IIS and EHR

There are two primary tools for improving HPV immunization rates with IIS and EHR: reminder/recall and provider prompts, sometimes referred to as clinical decision support. Both are recommended ways to improve immunization rates by the Centers for Disease Control and Prevention’s Community Preventive Services Task Force, which conducts systematic reviews to determine whether interventions have been proven effective in improving health.3,4,5 Both have also been successfully applied specifically to improving HPV vaccination of adolescents.6,7 Regarding modalities, mail, phone, and text have all been demonstrated to be effective.8 One study found that providing the option for parents to choose their preferred contact method (i.e. text, email, phone, letter, or some combination) was effective in increasing HPV series completion.9 63% of intervention adolescents completed the series compared to 38% of controls, and they were also more likely to do so on time. The authors of a recent systematic review suggest that “provider targeted interventions appeared to be most successful for HPV series initiation while patient targeted interventions appeared to be most successful for series completion, indicating that providers pose a more significant barrier to vaccine series initiation, while patient or family barriers are a greater hindrance to series completion.”10 While the literature robustly supports the potential of these two interventions to improve HPV immunization rates, studies often lacked specific information on how to optimize their implementation.

The utility of IIS and EHR depends upon having complete and accurate data. The ability of different systems to effectively share and use data is referred to “interoperability.” In recent years, more reporting is shifting from one-way “batch” or “flat file” reports from EHRs to IIS to real-time and bidirectional data exchange. This change has been supported by national efforts including Centers for Medicare and Medicaid Services’ meaningful use incentive program and federal initiatives to develop standardized formats for public health data exchange.11 Nonetheless, developing the best possible data exchanges – while likely to contribute to data quality, user satisfaction, and overall utility of both IIS and EHR – does take resources including technical expertise, which are not uniformly available.
Using IIS for Reminder/Recall

In the United States, each state has its own immunization registry, which may be developed by the state or by an information technology vendor. Due to the variety of immunization information systems used in the United States, organizations such as the American Immunization Registry Association (AIRA) and the Centers for Disease Control and Prevention develop and promulgate guidelines for functional standards, best practices, and more.

The American Immunization Registry Association has created a guide to using IIS successfully for reminder/recall interventions through a work group approach.\(^{12}\) While not reflective of the standards of peer-review generally required by health and medical journals, this process developed a consensus based on the practical experience of subject matter experts. They state that “The Work Group intended to maintain an appropriate mix of practical real world public health considerations and peer reviewed recommendations for the IIS community. In the guide, they identify functionalities that IIS must have for effective implementation of reminder/recall, listed in Box 1.

**Box 1: IIS Functionalities for Effective Reminder/Recall\(^{12}\)**

- Functionality to track patient active/inactive status at provider and geographic levels
- Reminder/recall algorithm that supports newly introduced vaccines (including new combination vaccines) in a timely manner
- Reminder/recall algorithms that include both ACIP recommendations and state-based school entry requirements
- Reminder-recall functionality that can be employed by providers as well as state and local public health agencies

AIRA also identifies contextual factors that impact the feasibility and effectiveness of reminder/recall interventions using IIS:

- Extent and timeliness of immunizations entered into the IIS
- Regular deduplication of IIS data
- Accurate patient and vaccine data, including contact information and active/inactive status

Additionally, they recommend using a reminder/recall status indicator to gather structured data rather than free text and recommend specific data to collect in reminder/recall status indicator data fields.

Finally, they identify the largest barriers to successfully using IIS to improve vaccination rates through reminder/recall: data quality of the IIS; cost and challenge of building reminder/recall functionality; lack of flexibility and user-friendliness of reminder/recall functionality; and lack of time, education, or resources on the part of providers to use reminder/recall functionality.
Using EHR for Provider Prompts

Several studies that evaluated the effectiveness of provider prompts in improving immunization rates offered commentary on barriers and facilitators to success. One challenge noted in multiple studies is that immunization recommendations are complicated and change frequently; therefore, provider prompts within the EHR must be updated at least yearly, adding to the cost of implementation. Furthermore, if they are not accurate, providers may be prone to mistrust or ignore prompts. One study suggested using a HEDIS-based algorithm rather than one based on ACIP recommendations because it is easier for practices with limited resources to create. In another study, barcode technology was implemented simultaneously with provider prompts, allowing staff to import relevant information such as vaccine lot numbers directly into their EHR system by scanning vaccine barcodes rather than entering it by hand. They found that integrating barcode technology reduced the time required to document immunization, improving both accuracy and staff satisfaction. Finally, a third study reported on the development of a centralized web clinical decision support service that could be accessed by multiple EHR systems, negating the need for each system to update its own algorithms. While the study did not report on the resources needed to create or use the service, it may merit further investigation as a way to eliminate some barriers to successfully implementing provider prompts.

One study did identify the barriers to successfully using provider prompts to improve adolescent immunization rates. They found that incomplete immunization records led to errors in the prompts, and that while providers preferred soft prompts (which can be dismissed by users without taking further action), they were also easier to ignore. By the same note, using multiple prompts at different points within the workflow might be effective but also irritating. They suggest incorporating provider prompts into quality improvement programs; offering incentives; and using prompts in tandem with additional strategies to improve immunization rates. Another study found that positive impact was achieved only when the screen flow was altered to make it harder for clinicians to ignore prompts.

In a commentary in Pediatrics, Sittig et al. suggest that prompts cannot resolve underlying challenges such as lack of patient acceptance, and can be effective when the recommended action is accepted by both patients and providers; if the prompt is clear and accurate; and if it is presented in a timely way when a provider can conveniently act on it. In the context of immunizations, this may mean that prompts will not address the challenges of vaccine hesitancy, but may be able to improve immunization rates among patients whose parents are already willing to have their child immunized.

Additional general guidelines are available for developing successful clinical decision support within EHRs. For example, Fiks comments on immunization-specific challenges such as accommodating vaccine shortages. He recommends communicating clearly with clinicians in advance, and ensuring that relevant data are accurate and reliable.

If EHR interfaces including provider prompts and reminder/recall are not adequately user-friendly, healthcare workers may develop “workarounds” to more efficiently complete their workflow. A recent study found that workarounds are often socially developed among colleagues, and are correlated with improved perceptions of the advantages and success of implementing EHRs. While inappropriate
workarounds at worst run the risk of negatively impacting patient safety and care, they argue that the “co-construction of the technology that occurs through workarounds has positive change outcomes.”

References


