Improving immunization data management: an editorial on the potential of electronic health records

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EXPERT REVIEWS

Immunizations are critical for maintaining individual and population health. Yet ensuring that complete immunization histories are available at the point of care is challenging. Currently, immunization information systems (IIS) are used to aggregate data at a regional level, although their value is often limited by incomplete data. The Electronic Health Record (EHR) Incentive Program, which is an unprecedented federal initiative promoting EHR use, is linking financial payments in part to demonstrating ability to transmit EHR data directly to IIS and thus has potential to change immunization data management on a large scale. We believe that EHRs are critical for allowing more complete and timely immunization data capture and will offer many benefits. To achieve these benefits, however, it will be necessary to engage the EHR vendor community in developing EHRs that allow for comprehensive immunization data capture and policy makers to incentivize bidirectional, real-time exchange between IIS and EHRs.

The challenges associated with immunization data

One of the most important ways of maintaining individual and population health is through immunizations. Widespread vaccination has resulted in near eradication of certain diseases and dramatic reduction in the incidence of many others [101].

Ensuring that patients are adequately vaccinated requires knowledge of their past vaccination history. However, obtaining these data can be challenging. Vaccine schedules are complex, changing frequently. The increasing use of combination vaccines necessitates that providers know not just at what age a patient received a vaccine, but also exactly which formulation was administered so that they can verify the individual components. Due to varying vaccine shortages, vaccines have at times been rationed, resulting in certain groups needing 'catch-up' vaccines at nontraditional intervals. Finally, over 20% of children receive vaccines from multiple facilities, increasing the potential for missing information at physician visits [1].

Immunization information systems

Immunization information systems (IIS) are confidential, population-based computerized databases that have been developed to gather and aggregate vaccination information for individuals in a specific geographic area – most commonly states, territories, or large metro areas. Their use has risen steadily in the past two decades [2]. This type of comprehensive, community-wide, near-real-time, longitudinal record system is necessary for individual healthcare and public health. IIS can support effective and informed vaccine administration by increasing the accessibility of accurate and complete immunization data for every patient at the point of care. Public health agencies also require this type of comprehensive data to effectively administer immunization programs and for disease surveillance.

Yet the potential of IIS has been limited by several factors. IIS need to be truly interoperable. Instead, IIS operate according to local and state specifications, rather than by unifying federal standards [3].

Effective IIS need to integrate data from multiple healthcare organizations and present data in a uniform and easy-to-use manner. The technical infrastructure is often outdated, however, system platforms are highly variable, and the capability for interoperability frequently lacking [3]. Finally, available immunization data captured currently in IIS are often of poor quality and incomplete, greatly reducing their value [2,4].

The EHR Incentive Program: policy driving change
One force likely to have a major impact on immunization data capture is the Electronic Health Record (EHR) Incentive Program commonly referred to as the Meaningful Use Program. This program offers financial payments to eligible hospitals and providers who purchase EHRs certified to meet certain capabilities and demonstrate 'meaningful use' of them. The Meaningful Use Program standards occur in stages, and include required (core) and optional (menu set) objectives that providers must achieve to receive payments.

In Stage 1, a menu set option was 'demonstrating capability through the EHR to submit electronic data to immunization registries/systems' [5]. In Stage 2, this option became a core requirement [6]. Thus, the EHR Incentive Program, which has resulted in significant increases in EHR adoption, is setting the stage for major changes in immunization data management [7]. Notably, however, there is no requirement for real-time, bidirectional exchange between EHRs and IIS, nor are there requirements mandating that the complete range of immunization data that could – and arguably should – be captured are captured (an example being vaccine lot number).

Transforming immunization data management through use of EHRs
While EHRs alone will not help solve the many challenges associated with accurately maintaining immunization data on large scale, we believe they are a critical part of the process. There are many potential benefits associated with use of EHRs as it surrounds immunization data at a provider, patient, and public health level. We will discuss each of these in turn.

Benefits to providers
EHRs with direct connections to immunization registries, as supported by the Meaningful Use Program, will allow immunization data, entered at the point of care, to be directly exported into registries. This has the potential to dramatically increase the completeness of information found in immunization registries. Indeed, a study in New York City confirmed that automated immunization reporting via an EHR improved both use and efficiency of reporting [8]. Moreover, this flow of data, if bidirectional, would allow physicians to not only update the vaccination records of their patients, but also view patient vaccination histories regardless of where the patient sought care.

Beyond simply allowing for data capture, EHRs have the potential to provide clinical decision support (CDS) to providers, resulting in fewer missed opportunities for vaccination. For example, a study of pediatric patients where clinical alerts appeared in the EHR for children with asthma due for the influenza vaccine found that decision support resulted in modestly improved influenza vaccination rates [9]. CDS would ideally include not simply clinical alerts, however, but also the complex programmatic logic behind recommended immunization schedules, thereby allowing this logic to be applied to individual patients. In addition, EHRs have the potential to enable providers to manage their entire patient panel (rather than just the patient present at a particular visit), promoting identification of those who are in need of vaccines and allowing those patients to be contacted and brought in for visits. This has already been successfully demonstrated [10].

Benefits to patients
First and foremost, better immunization data management will help ensure that patients are fully vaccinated and therefore protected from vaccine-preventable diseases. EHRs have the potential to do so not just by providing more complete information to providers, but also by providing patients with access to their own immunization records. For example, some EHRs are tethered to a personal health record, which is an electronic tool that patients can use to track and manage their own medical information. We encourage greater development and use of this functionality within personal health records.

Benefits at a public health level
In addition to the aforementioned benefits, direct linkage of vaccine data from EHRs into immunization registries will allow for improved monitoring of population health. The National Immunization Survey provides important information for the nation in terms of current vaccination coverage. However, as a telephone survey, it is limited in terms of timing, potential subgroup analyses, and small geographic area reporting. High-participation IIS with reliable feeds from clinical EHRs should move much closer to a true census. In addition, in the instances of vaccine recalls, public health agencies would potentially be able to send notifications to providers through the EHR, helping to ensure that this knowledge rapidly disseminates among the provider community. It could also allow for improved tracking of patients who received a recalled vaccine lot. NYC has demonstrated the success of this type of strategy using an IIS [11].

Caveats
While we strongly believe the EHRs can and will significantly improve immunization data management on a large scale, there are important caveats that must be addressed and substantial work to be done before the aforementioned benefits will be realized. First, data captured in EHRs must contain the complete range of immunization data necessary to optimize individual and population health management. These data should include all the core elements recommended by several groups, including the CDC [102]. To ensure comprehensive data capture will require a commitment from the vendor community to build this capability into EHRs and from providers to ensure these data fields are entered.

In addition, providers must enter data into EHRs in a way that it can be automatically transferred to immunization registries. Providers frequently enter data into 'free text', rather than structured fields. This would result in failure to capture that data in immunization registry systems. This has been demonstrated to be a problem when using EHR data for performance monitoring, and if applied to immunization data, would lead to information gaps in immunization registries that may result in incomplete patient vaccination histories for patients [12].

The challenges associated with providing vaccine-related CDS to providers should also not be underestimated and requires a nationally coordinated approach. Rather than having each IIS or EHR vendor develop and maintain their own CDS logic, the CDC is working to develop open source CDS logic [103]. We recommend that EHR vendors adopt this CDS logic and, in turn, help with its maintenance.

Finally, real-time bidirectional ability to exchange data between EHRs and IIS is also essential. Because current meaningful use does not require this, there may be little incentive for vendors and organizations to work toward this goal. A significant investment in infrastructure, implementation resources and ongoing technical support will be required on both the EHR and the IIS end for this to become a reality.

We would strongly urge federal policy makers to consider mandating real-time, bidirectional data exchange in future stages of meaningful use.

As part of this process, the role of State Health Information Exchanges must be considered. Federal investments are promoting the secure exchange of health information through the Statewide Health Information Exchange Cooperative Agreement Program, and many states have already begun to develop data use agreements for data sharing [104]. Thus, in some areas, immunization data may go directly between EHRs and IIS, while in others, data may go through the State Health Information Exchanges to the IIS. We recommend studying the advantages and disadvantages of both types of arrangements to identify best practices going forward.

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