Preparing for COVID-19 Vaccination: A Call to Action for Clinicians on Immunization Information Systems

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Vaccines for coronavirus disease 2019 (COVID-19) are currently being administered under emergency use authorization through a tiered prioritization process determined by states with federal guidance (1). As a critical component of vaccination plans, immunization information systems (IISs) play a central role in coordinating distribution, administration, documentation, and monitoring of COVID-19 vaccination by confidentially collecting and consolidating vaccination data from multiple providers within a geographic area (2). Among other tools, IISs are critical to ensuring adequate vaccination across targeted populations and geographic areas.

Introduction to IISs

The United States has an independent network of 61 IISs in 49 states, the District of Columbia, 3 cities, and 8 territories (3). Of note, the remaining state without an IIS is in the process of launching a system. Most IISs were developed as either "homegrown" systems or off-the-shelf systems offered by commercial vendors. Understanding how IISs were developed provides insight into their base functionality. Although IISs are customized to meet local needs, all are developed using functional standards, core data elements, and the same Health Level 7 standards that electronic health record (EHR) systems use to facilitate standard data capture.

Collectively, IISs capture immunization data representing approximately 96% of children, 82% of adolescents, and 60% of adults (2), with wide variation across jurisdictions for adults (ranging from <25% in 5 jurisdictions to >95% in 6 states) (**Appendix Figure**, available at Annals.org). In 2019, IISs nationwide attained this level of representation through more than 117 000 real-time connections with health care organizations (such as health systems and pharmacies) (3) and through traditional web-based user interfaces. Immunization information systems are queried by EHR systems to access patients' consolidated records. Most–but not all–IISs are capable of bidirectional data flow (that is, the IIS receives and delivers information). In 2019, 45.8% of connections were bidirectional, 50.6% enabled submission to the IIS only, and 3.5% enabled the IIS to provide data only (3). Bidirectional data flow is an important feature because it allows data to be shared across IIS users (for example, public health, health care partners, and clinicians), which provides a more thorough picture of a patient's immunization history and forecast. An efficient IIS–EHR interface (one that is reliable, fast, and easy to use) decreases barriers to use for the busy clinician and meets the goal of improving interoperability for immunization information among providers and facilities set by the Centers for Medicare & Medicaid Services in its Merit-based Incentive Payment System (4). A traditional web-based user interface is also available for clinical settings without an EHR–IIS connection.

The National Vaccine Advisory Committee's standards for adult immunization practice (5) call on all health care professionals to assess all adults for their immunization status at every clinical encounter, to strongly recommend needed vaccines, to administer or refer to a vaccine provider, and to document administered doses in both the EHR and IIS. Despite these recommendations, many clinicians for adults are unaware of the existence of IISs and how to access them (6). Additional training in this regard would be useful. Without accessing IIS data, clinicians have incomplete vaccination information to make decisions.

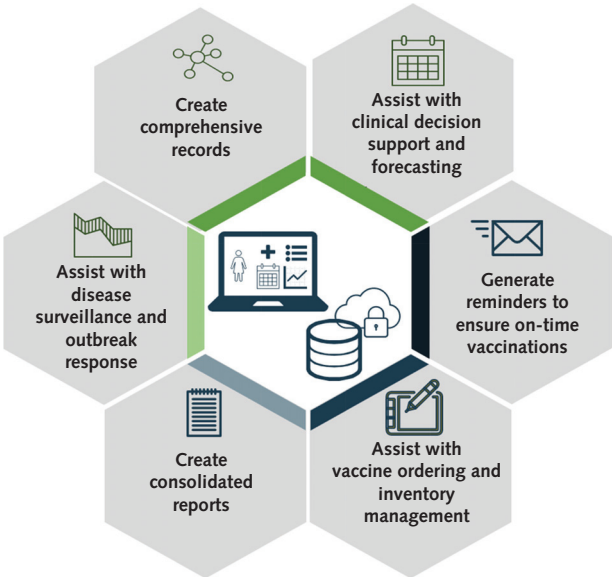
Immunization information systems do much more than register vaccine doses administered. They have evolved into integrated systems that are near-real-time databases capable of bidirectional connections and central to clinical and public health decision making (2, 3, 7). They can create comprehensive confidential records; assist with clinical decision support, vaccine ordering, and inventory management; generate reminders to ensure timely vaccination; and support disease surveillance and outbreak response (2, 3, 7) (**Figure**). Past experiences with public health emergencies (such as H1N1 influenza vaccination and Hurricane Katrina) highlight the role of IISs in emergency response (for example, recruiting and onboarding clinicians for vaccine administration, accounting for vaccine inventory, informing equitable vaccine distribution, tracking vaccine uptake, and averting the need for costly revaccination) (2, 3, 7, 8). These experiences have informed COVID-19 response efforts (9).

IIS Use During the COVID-19 Response

Nearly all IISs–and, by extension, clinical sites ordering COVID-19 vaccine–are being used to order, distribute, and account for vaccine. In recording administered doses, IISs can then link doses distributed with doses administered. They make information about COVID-19 vaccination status available in real time or near real time; accept and store information from numerous users of all types; and document and track specific vaccine products and doses administered, which is critical given the availability of multiple vaccine products that are not interchangeable. With limited initial vaccine supply (1), IISs can assist in determining the equitable allocation of available vaccines, plan and forecast when additional doses are recommended, help ensure that patients are getting the correct vaccine, and monitor vaccination series completion (9).

This article was published at Annals.org on 2 February 2021.

Figure. Features of IISs.



IISs are comprehensive and confidential central repositories of vaccination administration information within a certain geographic area. Key features and uses include the following. Vaccine administration information is often bidirectional and available both for accessing and contributing vaccination data. IISs are often integrated into the electronic health record, allowing IIS information to be available to clinicians at the point of care. IISs can provide clinical decision support and forecasting of future vaccine doses and can generate reminders to support on-time vaccine administration and series completion. IISs can support vaccine inventory ordering, tracking, and management. IISs can allow clinicians to create consolidated and comprehensive vaccine reports to assess and target vaccination efforts and can assist with disease surveillance and outbreak response. IIS = immunization information system.

The Critical Role of Clinicians in Maximizing the Utility of IISs

Clinicians can take an active role in preparing for COVID-19 vaccine administration and contribute to maximizing the utility of IISs in the following 4 ways. First, become familiar with the local IIS and how it interfaces with your EHR system. Clinicians may be surprised to find that vaccination information from the IIS is currently available within their EHR. Second, contact your information technology department to determine if manual data requests are required for immunization information to flow between the EHR and IIS, or if this occurs automatically. Third, contact your state or local health department to be onboarded into the IIS if you are not connected. Onboarding refers to the process required for a clinician or health care organization to access and connect to the IIS (10). If EHR onboarding is delayed or not possible, health departments can provide information and training, if available, for web-based user access to the IIS. Fourth, share knowledge of the IIS with fellow clinicians and clinical team members, organizational leadership, and administration to facilitate wider awareness and use of the IIS.

These recommendations are directed at providers in individual and small-group practices, health systems, and integrated delivery networks. However, we also recognize that the limited funding to support modernizing systems to fully adopt standards and the investments required to prepare and onboard all providers are real and significant challenges to providers, health systems, and public health.

Conclusion

Broad and equitable use of COVID-19 vaccines will be instrumental in mitigating and managing the pandemic. Immunization information systems are part of the critical infrastructure being used in COVID-19 vaccine plans to coordinate among multiple partners and systems for vaccine allocation, distribution, administration, and monitoring. Clinicians play a central role in not only administering vaccines to patients but also ensuring that all doses administered are accurately reported in the IIS.

Clinicians can take steps now to familiarize themselves with their IIS and how its use can be integrated into their individual and clinic workflows. The more clinicians are aware of and connected to their IIS, the better the vaccination campaign will be in addressing equitable vaccine distribution, managing vaccine uptake, and monitoring vaccination series completion. Strengthening clinician engagement will lead to more robust IIS data, thereby enhancing clinical care and public health decision making, which are critical to immunization programs under routine and emergency conditions.

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Disclosures: Disclosures can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M20-7725.

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Ann Intern Med. doi:10.7326/M20-7725

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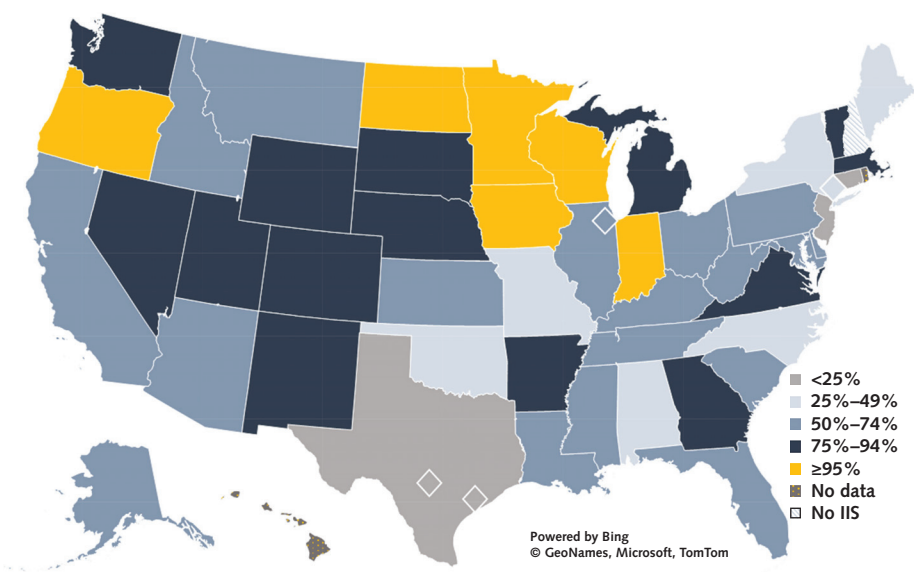
Appendix Figure. Percentage of U.S. adults aged ≥19 y participating in an IIS.



Data are from the United States; 5 cities (Chicago, Illinois; Houston, Texas; New York, New York; Philadelphia, Pennsylvania; and San Antonio, Texas); and Washington, DC in 2019; territories are excluded. Chicago, Houston, and San Antonio are each part of their state IIS. IIS = immunization information system. (Adapted from reference 2.).