HUMAN VACCINES & IMMUNOTHERAPEUTICS
2018, VOL. 14, NO. 1, 163–164
https://doi.org/10.1080/21645515.2017.1372069

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COMMENTARY

Ten years of experience and progress of electronic immunization registry system in Jiangsu Province, China

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ABSTRACT

The electronic immunization registry system (EIRs) can improve the vaccine coverage monitoring significantly. The EIRs in Jiangsu Province, China was set up since 2006. In this paper, the mechanism and structure of the EIRs were summarized, and then some function of this system were illustrated. The application of the EIRs was believed to be an effective health management and electronic vaccine record quality improvement tool in China. The experience and progress we gained could provide a valuable example for other countries.

ARTICLE HISTORY
Received 26 July 2017
Accepted 22 August 2017

KEYWORDS
Vaccine; electronic immunization record; registry system; coverage rate; infectious disease control

Vaccine immunization is the most effective and efficient way to prevent vaccine-preventable diseases. The computerization of immunization registries is an important part of the national Expanded Programme of Immunization (EPI). The use of electronic immunization registries can improve coverage monitoring in terms of particularity vaccination timeliness and accuracy.[1] Vaccine registries are population-based systems that contain core individual-level information on the population, together with records of immunization status, usually for the childhood vaccination programs. These systems are linked to a variety of program management, surveillance, and research tasks.[2, 3] However, there is currently no perfect national Electronic Immunization Registries System (EIRs) in China. Nevertheless, Jiangsu Province in China has made rapid progress in developing and implementing EIRs in recent years. Jiangsu Province lies in the eastern part of China and has a population of 78 million. The total area of the province is 103,000 square kilometers. There are 13 prefectures and 106 counties in Jiangsu Province. The average annual birth rate was about 13‰ in recent years, which means about one million newborns were delivered every year. Each prefecture and county had its own local health bureau and Centre of Disease Control and Prevention (CDC). Additionally, there is a provincial CDC in the provincial capital. Children born in Jiangsu Province received EPI vaccines at a local vaccination clinic (VC) near their home free of charge, with about 1800 VCs located in Jiangsu Province. In order to improve the quality of service of EPI, the EIRs was set up in Jiangsu Province in 2006.

The EIRs of Jiangsu Province involved VC client and provincial center serves. When a newborn receives the first dose of hepatitis B vaccine (HBV) in the delivery room of the hospital, an HBV immunization certification is presented to the parents. The parents can then get a vaccination card made listing the first dose of HBV immunization certification, and receive the rest of EPI vaccines at a VC nearby their home. Children's information, such as name, birth date, home address, record of vaccination, and possible adverse event following immunization (AEFI), are documented by the immunization doctors of the EIRs VC client, and automatically uploaded to provincial central servers. The provincial central server receives, stores and processes all the individual children's vaccination data records of Jiangsu Province. The data in provincial central server were summarized, exchange, and processed. Finally, they were generated EIRs quality management reports. These reports include vaccine coverage rates, incidences of AEFI, a list of unvaccinated children, and information concerning vaccine and cold chain management. These reports are then delivered to different levels of the health bureau and CDC of Jiangsu Province. Meanwhile, individual children's vaccination records can be also synchronized to their parents' cellular phone through application software. By 2016, a total of eighteen million children's vaccination records were stored in the EIRs central server. The detailed structure flow chart of EIRs is illustrated in Figure 1.

The EIRs in Jiangsu Province has been extensively used in EPI for vaccine-preventable diseases. Some applications of the EIRs in Jiangsu Province are as follows: First, because the exact data on the quality of vaccinated children cannot be obtained from the current China AEFI surveillance system directly,[4] the incidence of AEFI was always estimated indirectly or calculated using reported coverage rates. Due to the target age population, the category of the vaccine and the accuracy of reported coverage rates, it was impossible to calculate vaccine coverage rates precisely using reported paper records, the incidence of AEFI cannot be directly compared between different areas. By using EIRs, the exact figures of different AEFI and the quality of vaccinated children can be calculated automatically. Therefore, the actual incidence of different types of vaccinations in different populations can be analyzed directly. Second, EIRs application

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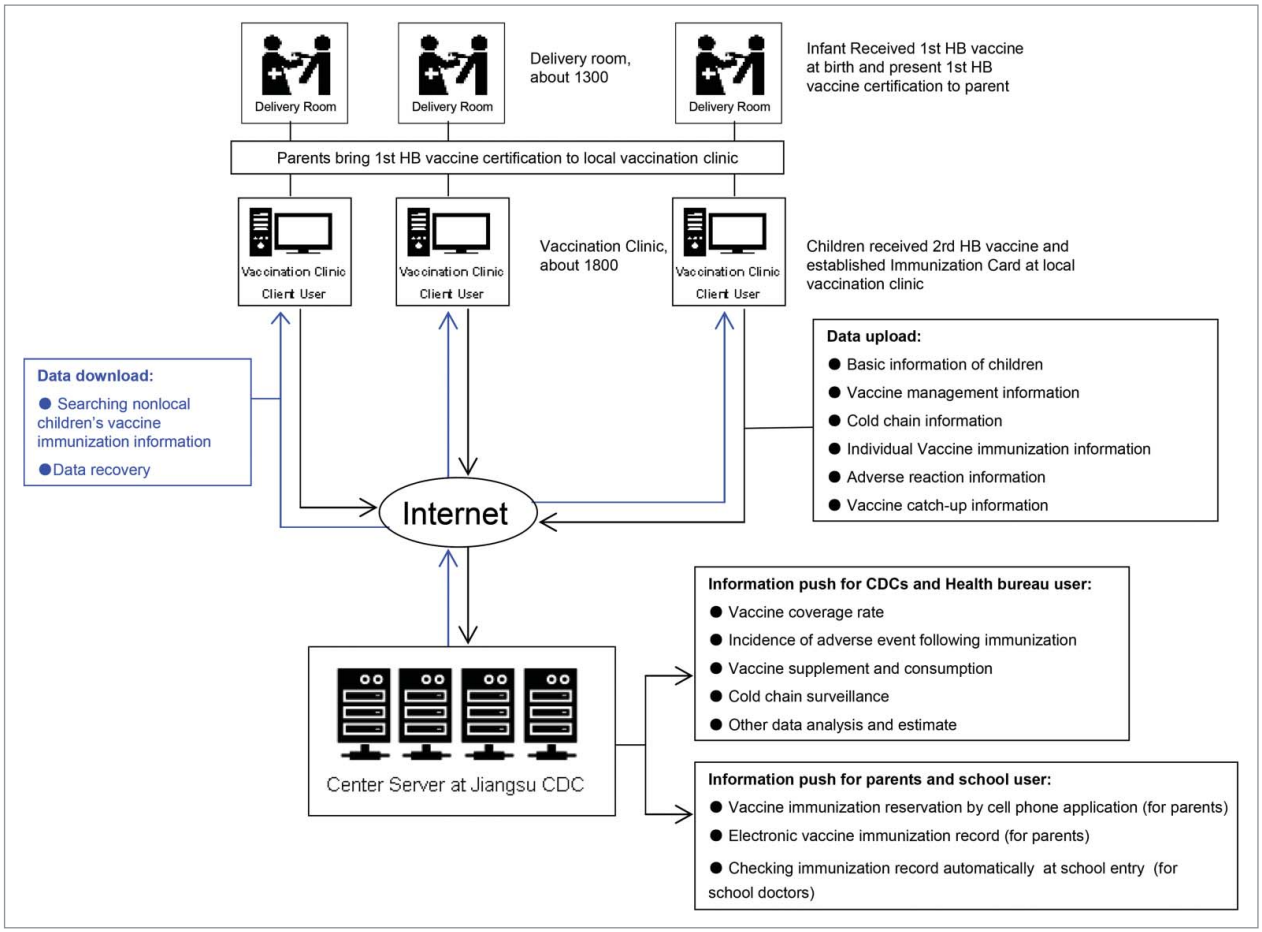

Figure 1. The structure flow chart of ECIIRS in Jiangsu Province, China CDC: Centre of Disease Control and Prevention.

programme (APP) for cell phone was developed, children's parent can download APP free. By APP, parent can making vaccine immunization reservation, checking vaccination record and receiving vaccine knowledge. Third, children are required to check immunization record and complete the EPI vaccine plan before they enter school or kindergarten in China, whereas the vaccine immunization record judgment was dependent on examination by doctors at the VC before the use of EIRs. Too much time and effort went into this judgment, and occasional mistakes were unavoidable. Currently, there is a vaccine immunization record judgment module in the VC client at EIRs. In this module, the doctors only need to input a child's name and birth date, and then the client will search and match vaccination records from the provincial central server. Also, the vaccination record and possible missing EPI vaccination data will be analyzed automatically, and presented in table format. Furthermore, as respiratory tract infection disease such as measles, rubella and varicella can easily break out at the area of low vaccine coverage, the EIRs can analyze the actual coverage rate of different kind of vaccine at the province, prefecture, county and village level. Also, the coverage rate report will be pushed for health bureaus and CDC periodically. Consequently, in order to prevent an epidemic of infection disease, preventive measures can be given by local health bureaus and CDC according to the reports of the EIRs in advance.

In the future, based on large data design and application of EIRs, increasing the execution speed and providing more functions and analytical methods on vaccine immunization will be priorities for the development. Moreover, the EIRs of Jiangsu Province was planed to be connected with maternal and child health system and healthy community residents' health records information management system. Particularly, finding ways to improve data security will be an important goal of this system.

Disclosure of potential conflicts of interest

No potential conflicts of interest were disclosed.

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