

Electronic Immunisation Registers: Challenges and Strategies to Implementation – A Cross-Regional Learning Resource from Linked Study Tour and Webinar

Introduction

In October 2023, the Linked Immunisation Action Network (Linked) partnered with The University of Sydney School of Public Health to host country teams from Bhutan, Laos, Indonesia, and Viet Nam for a study tour to Australia to explore the history, structure, use, and features of the Australian Immunisation Register (AIR). In examining how Australia developed and scaled the AIR over time, important strategies and lessons emerged.



In December 2023, Linked hosted a webinar exploring the challenges and barriers related to implementing and scaling Electronic Immunisation Registers (EIRs). Participants of the AIR study tour joined representatives from Guyana, Honduras, and Nicaragua virtually to share the main takeaways from their trip to Australia and exchange experience cross-regionally. **This learning resource synthesizes the shared challenges and major lessons or strategies that emerged from both engagements.**

Electronic Immunisation Registries (EIRs) are computerised immunisation registers that record vaccinations at the individual level and allow reporting of individual-level vaccination histories. WHO and others recommend EIRs as a cost-effective tool that helps reach zero-dose children, track, increase and sustain coverage, improve equity and the timeliness of vaccination, reduce reporting errors, resolve barriers to sharing immunisation status with other public services, and provide granular and reliable data to support epidemiological research and the evaluation of immunisation programme performance for activity planning and decision-making [1-8]. Unlike immunisation management systems, EIRs provide individual person-level data and are designed to serve the needs of both healthcare providers and the public. Although few countries have adopted EIRs to support routine immunisation, many have implemented EIRs to track COVID-19 vaccinations, leading to renewed interest in EIRs supporting routine immunisation.

Common Challenges to Implementation

During the webinar, Dr. Andrea Uboldi – pediatrician, infectious disease specialist, and current Secretary of the Ministry of Health of the Province of Santa Fe in Argentina – presented on the common challenges related to scaling EIRs in the Latin American region. Participants of the study tour from the Asia-Pacific region shared many of these challenges across various stages of implementation.

- Implementation requires **political will and significant investment in financial, material, and human resources**.
- EIRs must be implemented alongside appropriate **legislation** which legally establishes the platform and provides a **framework for data use and protection**.
- A successful EIR involves many professionals to develop and manage the platform, but also the **capacity and trust of the facility-level health workers** to use it. In order to function effectively, EIRs require that all frontline vaccinators and health administrators are trained in data entry and quality assurance.
- In many countries developing EIRs, there are **remote communities** that lack **internet connectivity** which may also be inaccessible for months out of the year due to climate or geography. In these cases, it is important to establish a plan for offline data collection and entry.
- It is important to plan for a gradual transition **from paper-based to digital records**, where the use of both can create problems for data integration and months-long delays in population-level data which compromises timely decision-making.
- Many countries, including Bhutan and Viet Nam, face challenges with trying to integrate **data entry systems that are not compatible or interoperable**. Competing health information systems can create issues with data duplication, increase burden on health workers, and result in higher administrative costs.

Sequenced Implementation

The development and implementation of an EIR will require slow and gradual progress as information technology and human resource capacity improves over time. **The Australian Immunisation Register (AIR), first established in 1996, was carefully planned with a phased implementation over multiple years that accounted for realistic challenges in scaling.** The transition to mainly electronic, real-time submission of AIR data by providers has been facilitated by the adoption of electronic health records (EHR) systems over time by almost all GPs.

Currently, 99% of vaccination reports in Australia are submitted electronically, which has significantly increased the system's efficiency. The former paper-based system with submissions via fax could take weeks to update, but the transition to an EIR reduced that waiting period to less than an hour. However, **it took several decades to reach a stage where most vaccination reports are easily entered electronically through an online**

portal or private Practice Management Software that is user-friendly and optimised for the task.

A participant from Indonesia who attended both the study tour and webinar observed that transition from manual to electronic data collection can cause many challenges, such as data completeness. Indonesia has plans to develop an offline-online data upload system for areas with limited internet access by 2024, with the understanding that **the transition will be gradual and require many iterations over time**. A webinar participant from Guyana shared their challenges with remote communities, internet connectivity, and the transition from paper-based to electronic record-keeping. One advantage of Guyana's data collection process, in which paper records are electronically formatted and shared at the regional and national level, is that the process has become routine and operationalised across the immunisation program.

“There is no method we consider as appropriate or as effective than having all your data at your fingertips.” – Participant from Guyana during the EIR webinar

Notably, while using e-submissions has clear benefits, Australia still allows paper submissions to ensure complete data entry, especially in **remote areas with poor internet connection**. Often, this is done by using WhatsApp to send pictures of the relevant paper forms. When designing the system, administrators planned for both paper and electronic submission in recognition of the fact that electronic submission by all providers would not be possible for many years. This approach allowed for the **gradual adoption of electronic submission as infrastructure developed and software were refined** to resolve technical glitches and delays.

Integration and Interoperability

As countries develop and expand their EIRs, an important consideration will be how EIRs **integrate and operate with other national information systems**. A successful, long-term strategy for implementing the EIR would be to set it up in such a way that data can be linked to other government agencies and systems, like disease surveillance, birth registries, and clinical information systems.

EIR data can be utilised for individual and population-level assessments to influence policy decisions and public health initiatives about education, employment, travel, government benefits, and more.

Study tour participants observed that the process for entering data into the AIR is



relatively simple. Once an individual visits their provider to receive a vaccination, their provider reports the information to the AIR. Healthcare workers can use the AIR to record, update, or correct patient immunisation data. Then, the data can be used by individuals, vaccination providers, and national and state health departments [9]. Study tour facilitators stressed the **importance of designing systems based on how people work to maximise ease of use and increase buy-in**, noting that it is essential to consider both the provider's and user's perspectives.

All providers use the same process to enter data into the system, regardless of their funding or location. Submissions can be made online through the provider private Practice Management Software, directly through the AIR site, or by uploading a paper form [10, 11]. The government agency tasked with designing and operating the AIR then coordinates with vendors to ensure Practice Management Software are up-to-date and compatible.

EIRs aim to track every individual within a country throughout their life course. In practice, this requires a national unique personal identifier for every person, including children. This could be a pre-existing identifier (e.g., a national identity number or social insurance number), a new identifier generated by the EIR system, or one issued by health authorities for general health purposes. Ideally, **the identifier can be used and integrated with other government information systems.**

Study tour participants recognised the use of multiple reporting sites and a lack of a unique identifier as barriers to systems integration, and shared strategies to addressing this. Indonesia plans to continue using multiple data entry systems that will be linked to the Satu Sehat application, using standard data points to ensure interoperability. Bhutan is establishing a link between its Bhutan Vaccine System (BVS) and the Electronic Patient Information System (EPIS). Viet Nam's National Immunisation Information System (NIIS) uses an EIR-specific identifier given to children. The system offers real-time immunisation registration and verification, as well as vaccine inventory management, and will soon be integrated into the Nutrition program. However, they recognise that the current system is a barrier to scale-up since it is not interoperable with other systems in the country [12].



Governance and Compliance

Presenters at the study tour shared learnings from the AIR and Latin American countries' EIR experiences that underscored the **importance of rigorous quality assurance measures and strong governance procedures and policies**.

The AIR is administered under the Australian Immunisation Register Act 2015 [9, 13], and AIR data is protected under the Privacy Act 1988. According to the 2015 AIR Rule, all released data must not reasonably identify a single person [9, 13]. The AIR Rule also outlines appropriate uses for vaccine data.

Mandatory vaccination reporting in Australia is enforced through education and facilitation rather than punitive measures. Comprehensive education and training modules are provided for healthcare professionals, including GPs, nurses, and pharmacies. Relatively **minimal data-entry requirements help increase compliance by making the system manageable and user-friendly**.

The precise delineation of roles and policies in Australia increases the likelihood of timely, accurate, and complete data reporting. Additionally, these **governance policies ensure the AIR data are used appropriately and in a manner that protects individuals' privacy**. Study tour participants recognised the importance of strong governance procedures and identified tools used in Australia that can be applied in their home country. During the webinar, a participant from Nicaragua shared that among the biggest lessons of scaling their EIR was the importance of the political commitment of authorities and the involvement of health personnel in using the new system.

Data Quality and Use

Throughout the study tour and webinar, presenters emphasised the importance of using EIR data to improve immunisation programmes, outcomes, and equity. While this may seem obvious, too often, programmes fail to build structures that encourage innovative analysis or spur progress beyond standard benchmarks. **In order to translate data into policy and planning, countries must work to ensure that data are complete and reliable**.

"We need a more agile online system with higher-quality data for better decision-making." – Participant from Honduras during the EIR webinar

The AIR is designed with comprehensive processes that have demonstrated reliability over time. The data validation processes in place involve both automated and manual procedures. A systematic process is followed to check, clean, and correct any issues in the data, highlighting Australia's **commitment to maintaining high standards and ensuring data integrity and quality** within the AIR.

The Australian system views AIR data as a national asset and prioritises enabling internal and external stakeholders to **use the AIR data to monitor vaccination coverage, investigate the effectiveness of vaccines and vaccination programmes, and inform immunisation policy and research** [9].

Monitoring immunisation coverage is vital for assessing programme efficacy, ensuring sufficient vaccination rates, and identifying areas with low coverage. The webinar

participant from Viet Nam shared that after seven years of growing their EIR, which is now used daily in 15,000 establishments across the National EPI and private sector, the National Immunisation Information System (NIIS) not only saves time and reduces the workload of their health workers, but also offers real-time immunisation registration and verification as well as vaccine inventory management. The participant of Indonesia shared that their EIR (the Asik application) uses vaccination data to send reminders to parents via WhatsApp when their child's next vaccine is due. Presenters encouraged participants to explore social science methods to understand and address underlying causes of low immunisation coverage in specific communities.



Conclusion

Linked's 2023 webinar and study tour highlight the importance of critical elements to successfully implementing EIRs, cross-sector collaboration and strong governance to ensure data quality and security. The history of the AIR demonstrates the importance of sequenced implementation and flexibility and patience when building a lasting and functional system. Linked members reflected on the importance of considering integration and interoperability from the start and supporting training and education to increase compliance with system standards. Finally, both engagements highlighted how EIRs can be used for immunisation policy research and decisions.

Linked is grateful for the active contributions of our country participants, presenters, and facilitators. For those who would like to hear more from our cross-regional exchange on EIRs, the webinar recording can be found [here](#). Based on strong country demand, in 2024 Linked will continue to support cross-country collaborative learning on the theme of EIRs, delving into these lessons in more detail.

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