Using open health exchange framework to develop Vietnam national HIV case surveilance system architecture

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Background

One of the core technical measures of Vietnam's National Strategy to End AIDS by 2030 is to develop a national HIV case surveillance (CS) system. The results of a landscape assessment on HIV health information systems in Vietnam showed that there were: 1) siloed multiple disparate systems; 2) no longitudinal patient records with limited patient data connection, leading to data duplication and inaccuracies; and 3) no centralized database to collate longitudinal clinical information of people living with HIV (PLHIV).

- Data is linked between administration levels, programs
- Be easy to use and convenient to access from anywhere, at any time, on any device
- Allow a quick understand of the HIV epidemic situation, enabling prompt public health interventions and responses
- Reduce the workload, facilitate better program planning and effectiveness towards ending the HIV/AIDS epidemic

Figure 1: HIV INFO SYSTEM 4.0

Method

The CS system architecture was developed based on OpenHIE (https://openhie.org) and tailored to the Vietnamese context. Open-source frameworks and international standards, such as OpenHIM (Open Health Information Mediator), HAPI Fast Healthcare Interoperability Resources (FHIR), and OpenSearch dashboards, were applied to create a centralized database and component layers for interoperability and data management. The Vietnam HIV case profile is designed as the data structure of the centralized database. Data quality was assured through using functions built to clean data, deduplicate data, and merge datasets.
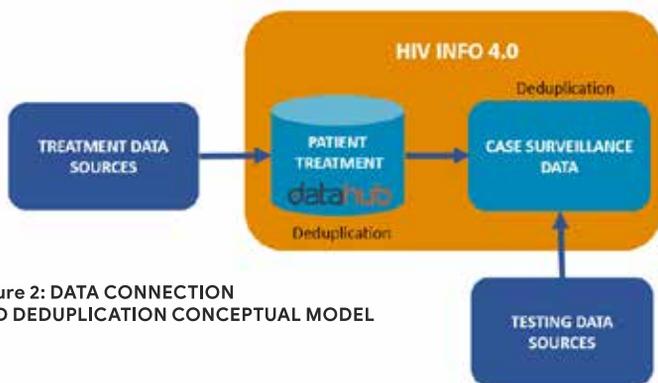
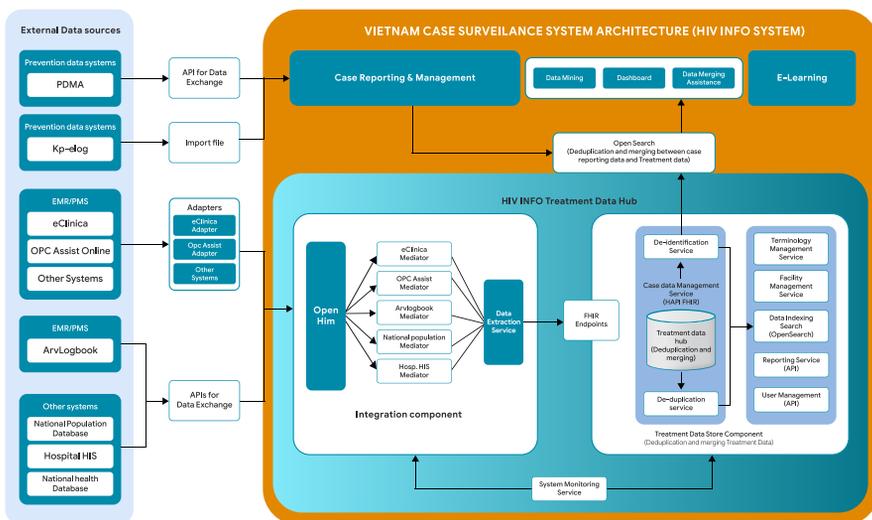**Figure 2: DATA CONNECTION AND DEDUPLICATION CONCEPTUAL MODEL**

Figure 3: VIETNAM CASE SURVEILANCE SYSTEM ARCHITECTURE

The CS system architecture includes six main components:

1. External data sources: testing data sources and treatment data sources in outpatient clinics (OPC) and hospitals are integrated to the national system. The deduplication process is conducted in the integration processes.

2. Integration component: OpenHIM and Mediator is used for integrating treatment data sources nationwide.

3. Case reporting & Management: covers all case reporting data.

4. HIV treatment data store: stores treatment data from various data sources nationwide.

5. Analytics: OpenSearch technology is used to merge data for case surveillance analytics

6. Dashboard and Data Mining: merging dataset is used for dashboard and data summarization.

Results

The component layers for interoperability were an effective solution for establishing a centralized database for PLHIV, interoperability between discrete HIV data sources to establish full HIV case profiles, and improving the quality of data inputs into the system. Patient matching algorithms are used of 80-90% accuracy in the actual data.
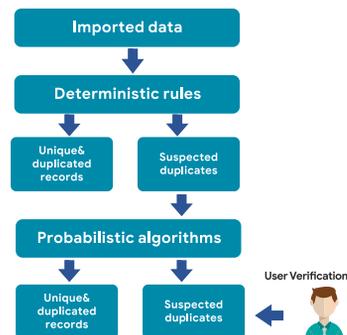
Figure 4: DEDUPLICATION PROCESS

Conclusions

The development of an overall system architecture using OpenHIE may have solved problems related to data quality and achieved the de-duplication of CS data in Vietnam. Vietnam has completed a case surveillance system for the first time based on OpenHIE.

This system architecture could be applied to other chronic or infectious disease surveillance systems.