



Design and implementation of a national public health surveillance system in Jordan



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ABSTRACT

Understanding and improving the health status of communities depend on effective public health surveillance. Adoption of new technologies, standardised case definitions and clinical guidelines for accurate diagnosis, and access to timely and reliable data, remains a challenge for public health surveillance systems however and existing public health surveillance systems are often fragmented, disease specific, inconsistent and of poor quality. We describe the application of an enterprise architecture approach to the design, planning and implementation of a national public health surveillance system in Jordan. This enabled a well planned and collaboratively supported system to be built and implemented using consistent standards for data collection, management, reporting and use. The system is case-based and integrated and employs mobile information technology to aid collection of real-time, standardised data to inform and improve decision-making at different levels of the health system.

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1. Introduction

Public health surveillance is the ongoing, systematic assessment of the health of a community [1] and a national public health surveillance system plays an important role in ensuring that reliable and timely health information is available to inform operational and strategic decision making at different levels of the health system. Despite its importance for evidence-based decisions, public health surveillance in many countries is weak, fragmented and often focused on disease-specific program areas. Surveillance programs often rely on multiple layers of reporting structure from the facility to central level, which can result in delays in release of data and substantial human and time resources may be spent on data cleaning and analysis before they can be released and interpreted correctly [2]. Data sharing may also be impeded if standardised approaches are not used for coding and formatting of data. For example, aggregated data may be collected and reported from disease registers for which there is no quality control over the case definition used. Furthermore, aggregated data can limit the ability to link epidemiological data to laboratory confirmation of

diagnosis and the ability to undertake contact tracing and follow-up of suspected notifiable diseases.

Technological and analytical innovations within public health surveillance systems, including the use of information and communication technology, may help in enabling standardised data to be collected in real-time, and several advantages have been discussed that could help to inform and improve decision-making [3,4]. Electronic information can be collected in a structured, coded manner and, if the tool is used within the consultation, skip-logic algorithms can be used to provide clinical decision support in support of diagnosis and management of disease [5]. Mobile information technology also enables other data sources, including population and mapping data, and other tools for data visualisation, including Google Maps [6], to be more readily integrated into the process of data collection, reporting and analysis [7,8].

2. Development of a public health surveillance framework in Jordan

An innovative national program of public health surveillance is being implemented across Jordan, in partnership with the Ministry of Health and World Health Organization (WHO), that uses mobile tools and an online framework for collection, analysis and

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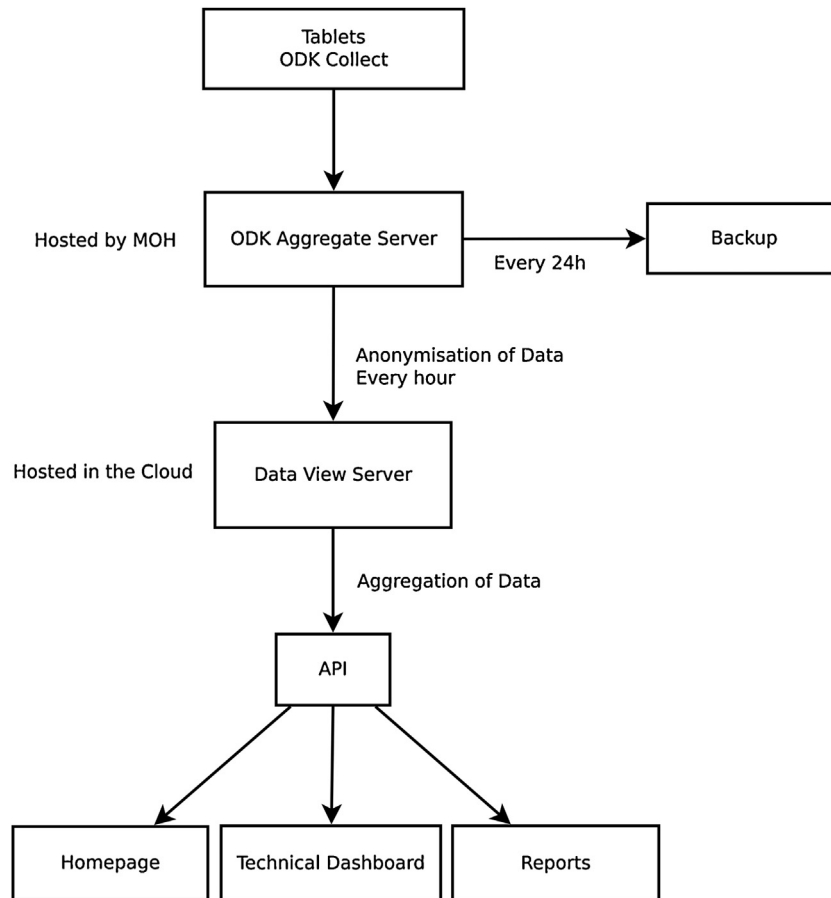


Fig. 1. Diagram of public health surveillance system components and data flow.

reporting of surveillance data. Following pilot project implementation between May to December 2014, national scale-up and implementation of the public health surveillance system in Jordan took place in a phased manner in April 2015. A total of 269 primary and secondary care facilities are currently included in the system, using 409 mobile tablets, across all twelve governorates of the country.

An enterprise architecture approach was applied to identify the key elements and relationships required to develop the national public health surveillance system in Jordan. This approach enabled important interrelationships to be identified and reduce subsequent risks of fragmentation, duplication and lack of interoperability. The approach also mitigated the application of information and communication technology in an unplanned and unstructured manner. Four domains defined the general model of enterprise architectural public health surveillance system, each of which are considered in the following sections.

2.1. Organisational architecture

The organisational architecture of the public health surveillance system defines the various business functions, process, governance, policy and resources required for its development and implementation. The Ministry of Health own and manage the system, and multiple departments including communicable disease, non-communicable disease, mental health, information technology and training were involved in its design and implementation. High level approval from the Minister of Health and Prime Minister was obtained to ensure appropriate policy and resources could be ensured for effective implementation. A number of

consultative meetings with other stakeholders and partners in the health sector, including military, private sector, other UN agencies and NGOs, are ongoing who may play a role in any future scale-up and implementation beyond the national health system.

The system was initially implemented as a pilot across 50 health facilities between May to December 2014 in northern Jordan, during which time technical aspects of implementation could be tested and refined. This period also enabled extensive consultation to take place peripherally (among health care workers) and centrally (among management) within the Ministry of Health to better understand needs and functionality for the system. This afforded institutional learning and buy-in to take place across the various departments and levels of Ministry of Health.

The first phase of national scale-up within Ministry of Health facilities began in April 2015 and the system is now operational in 269 facilities at primary, secondary and tertiary care level. The Ministry of Health conducted all training for implementation of the system, which included facility-level health care workers, governorate level and central health management. Training is continuous among all levels of the health system and a total of 1738 health personnel and 48 managers have been trained to date in use of the system.

2.2. Data architecture

The data architecture of the public health surveillance system includes the data model, data dictionary and classification of standards and systems used. Mobile tablets are used by health workers within the consultation to provide case-based reporting of disease as well as to introduce electronic modules for prescribing, using the

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