

Antimicrobial Resistance Surveillance: WHONET and DHIS2 integration in Bangladesh

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BACKGROUND

Antimicrobial resistance (AMR) is an emerging public health threat causing significant morbidity, mortality, and healthcare costs especially in low- and medium-income countries, but to date few groups have explored advanced AMR data management within DHIS2. In this work, we describe a collaboration between the Bangladesh Ministry of Health and Family Welfare's Directorate General of Health Services (DGHS), the CAPTURA Project (Capturing Data on Antimicrobial Resistance Patterns and Trends in Use in Regions of Asia) led by the International Vaccine Institute (Republic of Korea) supported by the UK Department of Health Fleming Fund, and the WHONET development team at the WHO Collaborating Centre for Surveillance of Antimicrobial Resistance (United States).

OBJECTIVES

To design, develop and pilot testing the interoperability for antimicrobial resistance surveillance among WHONET and DHIS2 in Bangladesh.

WHONET & DHIS2

WHONET, www.whonet.org, is a free software promoted by the World Health Organization supporting local, national, regional, and international resistance surveillance activities in over 2,500

human, animal, and food microbiology laboratories in over 130 countries. WHONET supports advanced automated features for interpretation of antimicrobial susceptibility test measurements by CLSI and EUCAST standards; multidrug-resistance profiles; 190 public health, clinical, and quality control isolate alerts; and statistical detection of hospital and community outbreaks using SaTScan. WHONET supports international guidelines for the management of "repeat" isolates, e.g., "first isolate per patient per species per data stratification and data subset", which is not supported by District Health Information System (DHIS2) core functionality. DHIS2 is a tool for collection, validation, analysis, and presentation of aggregate and patient-based statistical data, tailored (but not limited) to integrated health information management activities developed by University of Oslo. WHONET's import tool BacLink permits the capture and standardization of microbiology data from diverse laboratory information systems, test instruments, and desktop applications.

METHODS

To support WHONET and DHIS2 interoperability, we have developed pre-defined and user-defined data export options of two types: 1) aggregate statistics (and associated metadata) to DHIS2 Data Sets; and 2) isolate listings

(and associated metadata) to DHIS2 Event Programs. These WHONET listing and analysis exports can be visualized within DHIS2 dashboards, pivot tables, charts, and maps. Metadata exports are consistent across all WHONET installations, permitting simple data exchange between DHIS2 instances.

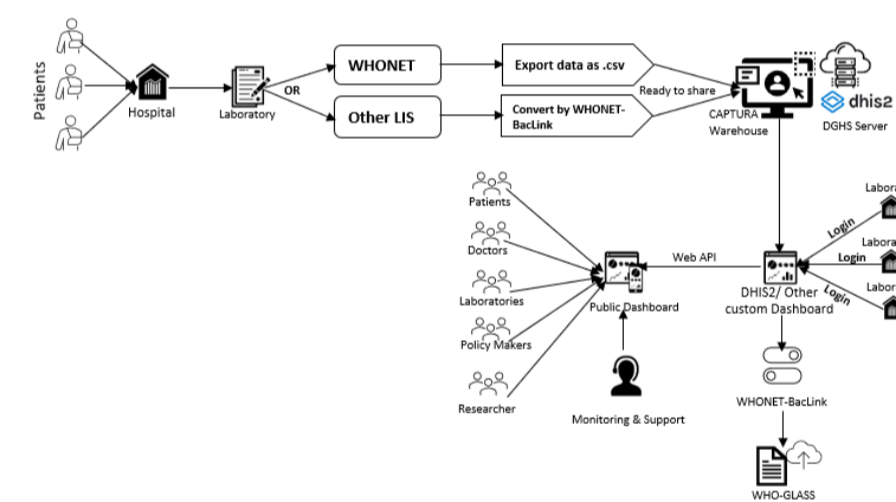


Figure-1: WHONET-DHIS2 interoperability and integrated AMR surveillance system flow diagram for DGHS.

RESULTS

In Bangladesh, we have installed WHONET in 31 laboratories and trained more than 140 microbiologists, clinicians, IT staff, and national AMR policymakers. Three years of laboratory data from 32 governmental and private hospitals in eight divisions are being submitted to the DGHS AMR-dedicated DHIS2 server through the WHONET-DHIS2 interoperability features described, leveraging both WHONET's advanced data management and alert capabilities for AMR data with existing Bangladesh DHIS2 platforms for web-based

visualization for all communicable diseases supporting the development, implementation, monitoring, and impact evaluation in near real-time of national resistance containment strategies.

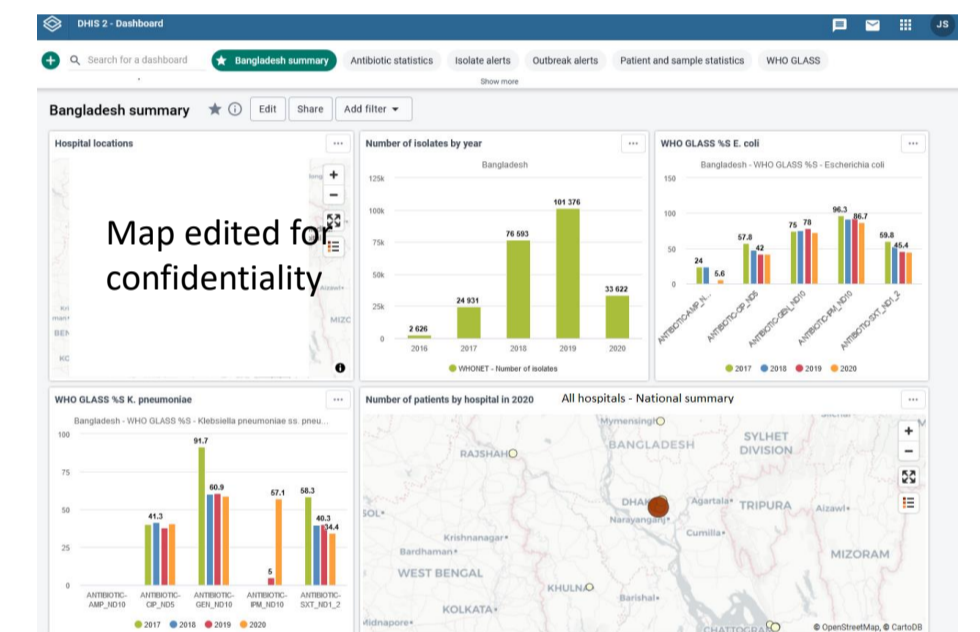


Figure-2: AMR data visualization in DHIS2 platform

CONCLUSION

WHONET and DHIS2 both are widely used by national authorities for surveillance and programming monitoring initiatives. This integration will help warehousing antimicrobial susceptibility test (AST) results centrally and the decision makers can guide antimicrobial therapy recommendations, necessary policy and early identification of hospital and community outbreaks using the unified collected data. Without an effective and representative knowledge on the data recording system, integration with nonidentical hospital/ laboratory solutions, identification methods, performance of AST of all the laboratories, it is not possible to develop an orthodox AMR surveillance system in Bangladesh.