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Collecting Infectious Disease Data from LARS and Improving Data Quality in Taiwan

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Objective

To improve data quality and sustain a good quality data collected by Laboratory Automated Reporting System (LARS), we use a Three-stage Data Quality Correction (3DQC) strategy to ensure data accuracy.

Introduction

To immediately monitor disease outbreaks, the application of laboratory-based surveillance is more popular in recent years. Taiwan Centers for Disease Control (TCDC) has developed LARS to collect the laboratory-confirmed cases caused by any of 20 pathogens daily via automated submitting of reports from hospital laboratory information system (LIS) to LARS since 2014 [1]. LOINC is used as standardized format for messaging inspection data [1, 2]. There are 37 hospitals have joined LARS, coverage rate about 59% of all hospitals in Taiwan. Recently, more than 10,000 of data are collected weekly and used in monitoring pathogen activity [3]. Therefore, it is important to ensure data quality that the data will lead to valuable information for public health surveillance.

Methods

A 3DQC strategy was designed to improve data accuracy and carried out by teamwork among TCDC, Taiwan Association for Medical Informatics (TAMI) and IT Company (Figure 1). In the first stage of 3DQC, IT Company checked data format. In the second stage, TCDC verified information between hospital inspection reports and data receiving in LARS. In the third stage, TAMI evaluated LOINC mapping and TCDC monitored stability of data transmission. After correcting the data, hospitals were approved to join LARS.

Results

During the first stage of 3DQC, we observed that some problems with syntax error in data (e.g. incorrect patient identification number, or lack of residence codes). Because some data were stored in Hospital information system (HIS) but not in LIS, an error may occur while hospital accessed records from HIS. In the second stage, 50-70% of inspection reports provided by each hospital had problems with semantic information error. For example, a positive result of influenza A on a screening flu test recorded in LIS but hospital transferred the wrong result with influenza B positive into LARS. In the third stage, we found that 20-30% of terms mismatched to LOINC code. This study categorized these terms into two groups (1) the Exception codes, which were considered reasonable and (2) the Error codes, and also reviewed Error codes and made a modified advice for hospitals to improve LOINC mapping. Through 3DQC strategy, the LOINC mapping rate raised from 40 to 80%, Exception codes mapping was 20%, and the total mapping rate was near 95-99% (Figure 2). So far, most hospitals have maintained a good quality data even they formally participate in LARS.

Conclusions

This study suggested that 3DQC can effectively detect problems and reduce errors of data collected from LARS, and indicated that effect of 3DQC can be maintained even hospital formally participates in LARS. Future research will focus on development of automatic programming of 3DQC to ensure high-quality data.
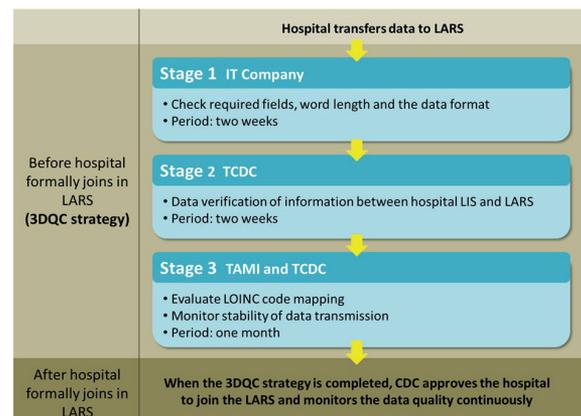
Figure 1. A Three-stage Data Quality Correction strategy
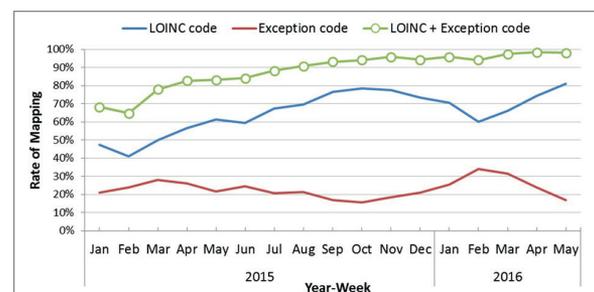
Figure 2. Rate of LOINC Mapping, 2015-2016

Keywords

laboratory automated reporting system; three-stage data quality correction; surveillance

Acknowledgments

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