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Development of the electronic surveillance monitoring system on web applications

Pichitpong Soontornpipit^{a,*}, Chukiat Viwatwongkasem^a, Chanvit Taratep^b,
Watcharawan Teerawat^b, Prachuab Vanitchatchavan^c

^aDepartment of Biostatistics, Faculty of Public Health, Mahidol University, Bangkok, 10400, Thailand

^bDepartment of Orthopedics, Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, 10400, Thailand

^cDepartment of Information Technology, Faculty of Information Technology, Dhurakij Pundit University, Bangkok, 10210, Thailand

Abstract

This paper presents the electronic surveillance monitoring system (ESMS) via the web based application used especially for the health sector. The system is created for three purposes, the alert function for the surveillance and rapid response team (SRRT), the monitoring for inspection and evaluation, and the back-office report. With the import and export functions that are capable to retrieve electronic health record and edit the R506 and R507 data, the SRRT and local team can easily set up and manage their resources. The GPS function helps care takers to identify the geographical data for any countermeasure and action. The program is designed to submit reports automatically to the Ministry of Public Health (MOPH). The SRRT module can operate in both on-line and off-line conditions.

Keywords: Surveillance monitoring system; Electronic health record; the surveillance and rapid response team (SRRT).

1. Introduction

To achieve the goal for the total health care, World Health Organization (WHO) suggests four health services: the continuum of care, the health promotion, the disease prevention, and the palliative care service. These services are the main key success factor for the concept of health for all and all for health. The concept of health for all basically covers the primary health care and universal health coverage¹. The ideas for responsiveness, efficiency,

* Corresponding author. Tel.: +66-02-354-8530; fax: +66-02-354-8534.

E-mail address: pichitpong.soo@mahidol.ac.th.

accessibility and availability are included. On the other hand, the concept of all for health is focused on health literacy, social and financial risk. WHO experts also recommended the care takers to concentrate their additional efforts on surveillance reports and epidemiological surveys in the community level, before moving to the hospital process^{2,3}. Both health promotion and the disease prevention require the multidisciplinary team, which combines staffs such as physicians, epidemiologists, nurses, and village head. Stakeholders from hospital levels and community levels must operate together to overcome the diseases under surveillance⁴.

In additional to take a countermeasure from the cause of outbreak, the Ministry of Public Health (MOPH) regulates the protocols and establishes the surveillance and rapid response team (SRRT). SRRT consists of local staffs from MOPH, health volunteer, and community head. When the disease is found either in a hospital or a community, a SRRT team will go to investigate and report back to the hospital and the department of disease control (DDC) at MOPH. All activities, processes and evidences including the outcome must be measured and responded back to headquarter in the sub-region within 72 hours. Moreover according to the guideline, several reports from SRRT and teams must be submitted within 1-3 days to avoid the repeated cycle⁵.

Depending on the situation and disease, some surveillance reports are required to daily process from the SRRT to DDC, where some are weekly. For example the case report for diseases under surveillance 506 and 507 (R506 and R507) is daily requested. Serious epidemiology are required to monitor and response immediately such as Middle East respiratory syndrome coronavirus (MERS-CoV) and swine flu. All infected states must be presented to the centers disease control and prevention (CDC), WHO as agreement in MOU. However, these protocols and reports contains many different sub-system parts in which paper-based documents are basically used, and thus it becomes very difficult and complicated to process and share the data. Many have been informally done and handled carelessly, and thus no evidence could be found or confirmed.

As reports have to send to different departments and organizations, this is a difficult task for the SRRT and epidemiologist teams to catch up with their routine. Many times they fail to process due to the short of mandate. Therefore, for better prevalence and prevention for the surveillance team, this research aims to design the system that can monitor, track, and alert the SRRT team along with other necessary functions such as submitting reports in order to fill the gap and solve the above problems.

2. Methodology

The ESMS is an electronic surveillance program designed by using web-based application to connect a SRRT, care providers and epidemiologist teams, and to process all protocols and documents with electronic forms. The concept of the program is to present four modules, the monitoring system, the alert and warning function, the job task system, and the report section. The existing processes and flows have been analyzed. The documents and files used for each process and the types of information are evaluated. The flow starts when the case is found either by a patient visit or a report. Warning and surveillance requests are issued from the epidemiologist team to three local organizations, SRRT, DCC, and municipality from Ministry of Interior (MOI). The case reports from sub-district and the field team are used to identify the priority of problem areas. If outbreak is contaminated, the final report will be sent to the provincial public health office and National Health Society Organization (NHSO). GIS and the web-based programming are added in order to determine the event location and abilities to retrieve the information.

As the design aims to replace the paper-based forms, new electronic record forms were designed for the SRRT and community health care team. All ESMS dataset of patients in the epidemic and surveillance services were simplified based on the process and data flow of R506 and R507 standard formats. All details were collected and analyzed in order to verify the problems and gaps between each informal process, and also to determine the informal documents such as Facebook, Line or Whatsapp. Moreover the connections between the data recorded in their processes were reorganized to minimize the under-coverage problems from the case report. Other problems such as when pandemic was subsided, OPD and IPD nurses only make a direct call to social medicine section for the patient that were sent for PCR were carefully considerate. The new dataset regarding to the new flow and stakeholder were listed as shown in Fig. 1.

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