Military Real-time Syndromic Surveillance System for Biosurveillance Portal in Korea

ChulWoo Rhee*1, Howard Burkom2, Changgyo Yoon1, Sangwoo Tak3, Aaron Katz2 and Miles Stewart2

1Armed Forces Medical Command, Seoul, Korea (the Republic of); 2Johns Hopkins Applied Physics Laboratory, Laurel, MD, USA; 3Joint Program Executive Office for Chemical and Biological Defense, Edgewood, MD, USA

Objective

This presentation aims to elaborate our experiences from initiating a syndromic surveillance system as a part of current biosurveillance developments in Korea. We developed Military Active Real-time Syndromic Surveillance (MARSS) system with data from all of 19 Korean military hospitals as a part of the US-ROK joint Biosurveillance Project.

Introduction

Biosurveillance Portal (BSP) is a web-based enterprise environment that is aimed to facilitate international collaboration, communication, and information-sharing in support of the detection, management, and mitigation of biological events in Korea. In Oct 2013, Republic of Korea (ROK) Ministry of National Defense has made the project agreement with United States (US) Department of Defense Joint Program Executive Office of Chemical and Biological Defense to develop Biosurveillance Portal which will provide tools and capabilities to facilitate timely identification and detection of biological events to minimize operational impacts on ROK-US Forces. As a part of this project, Armed Forces Medical Command (AFMC) undertook the initiative to develop the Military Active Real-time Syndromic Surveillance system.

Methods

AFMC currently operates 19 military hospitals across the country, and all electronic health records including patient information, ICD-10 diagnoses and medical prescriptions are collected daily to a centralized server. All the relevant data from Jan 1st 2012 to May 31st 2014 were retrieved, including total patient counts and counts of patients with specific diagnoses. Seven syndromes were chosen for surveillance based on clinical syndromes and manifestations likely resulting from the suspected use of weaponized pathogens. The selected syndromes are Respiratory, Gastrointestinal, Botulism, Dermatologic, Neurologic, Hemorrhagic, and Fever. The syndrome definitions for diseases associated with critical bioterrorism-associated agents were derived based on the characteristics of MARSS time series using daily counts of ICD-10 codes for each syndrome. For example, series based on the respiratory and fever syndromes clearly showed seasonal variation while series based on the other syndromes did not. Lower algorithm thresholds produced shorter detection delays but also reduced PPV. We chose thresholds with PPV above 30% to avoid excessive alerting. For the rarer syndromes such as Botulism and Hemorrhagic Illness, true outbreaks are very rare, and algorithm settings were chosen to avoid frequent nuisance alerting.

Conclusions

Despite the shared surveillance purpose of different syndromic groups, the frequency and seasonality of endemic illness underlying each group should be used for separate algorithm adjustment. For deciding alert thresholds, we have considered not only statistical aspects but also the capacity for alert investigation. More efforts are required to validate the system-generated alerts, and standard operating procedures to investigate these alerts are being developed.

Keywords

Biosurveillance; Syndromic Surveillance; Bio-threats; SAGES; ESSENCE

Acknowledgments

This study was funded by Armed Forces Medical Command. (AFMC 2014-024)

References

1. CDC. Syndrome definitions for diseases associated with critical bioterrorism-associated agents. Atlanta, GA: US Department of Health and Human Services, CDC, 2003. Available at http://www.bt.cdc.gov/surveillance/syndromedef/index.asp.

2. CMS. Official Industry Resources for the ICD-10 Transition. Baltimore, MD: US Department of Health and Human Services, CMS, 2014. Available at http://www.cms.gov/Medicare/Coding/ICD10/index.html.

*ChulWoo Rhee
E-mail: rhee275@gmail.com