Detection of Novel Enteroviruses with Emergency Department Based Syndromic Surveillance System in Taipei City

T.S. Wu[1,*], S.F. Chang[2], W.R. Chen[1], M.Y. Yen[3], C.L. Kao[2], C.C. King[1]

[1] *Institute of Epidemiology, National Taiwan University, Taipei, Taiwan*
[2] *Department of Clinical Laboratory Sciences and Medical Biotechnology, National Taiwan University, Taipei, Taiwan*
[3] *Department of Health, Taipei City Government, Taipei, Taiwan*

Background: Taiwan suffered a serious Enterovirus-71 epidemic in 1998 and 78 children were dead from the outbreak. Several infectious disease surveillance systems were designed to detect virus situation in the community. However most of the surveillance system were passive surveillance and relied on physician reporting. Hence that an emergency department based syndromic surveillance system (ED-SSS) was developed and adopted in Taipei city after 2003 SARS outbreak. We aimed to use the syndromic surveillance to identified enterovirus-like illness (EVI) patient and triggered for the specimen collection and virus detection.

Methods: There are 5 hospital enrolled in the ED-SSS in Taipei city. The EVI case number is daily and automatically generated by the system. We use historical control limit and CUSUM method to be abnormal detection algorithm. Only if the system indicated abnormal signal, the ED staffs collect specimens from EVI patient. All samples would be tested by RT-PCE and virus culture with influenza virus, enterovirus, adenovirus, etc. to identify the disease cause agent.

Results: There were total 161,366 ED visits and 304 EVI cases were identified by the ED-SSS during Jan. 2007 to Oct. 2007. According to the historical control limit method, 29 EVI signals were triggered. We collected 169 samples from 5 hospitals to identify disease cause agents. The overall virus isolation rate is 15.4% (26/169). Six of 26 positive samples were enterovirus. The EV cases virus serotypes were CA16 (66.7%) and CA6 (33.3%). They were all under 7 year old children and the gender distribution is two males and four females respectively and distributed in different area of Taipei city.

Conclusion: The syndromic surveillance system could provide public health department to initiate active surveillance with scientific evidence. Taipei city is the first metropolitan using such active surveillance to rapid response and capture virus activities in Asia. The integration of syndromic surveillance and other different surveillance systems is the most important future work. We also will to cooperate with other city to establish international cooperate surveillance to detect novel enteroviruses and other emerging infectious cause agents.

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Facing the Global Challenges of Emerging and Re-emerging Infectious Diseases in Taiwan

C.C. King[1,*], T.S.J. Wu[1], H.P. Lin[1], C.J. Lee[1], C.L. Kao[2], C.Y. Lin[1], S.T. Ma[1], Y.C.L. Chu[1], C.S. Huang[3], H.Y. Lee[4], D.C. Chan[1], S.F. Chuang[2], M.Y. Yen[5], C.M. Liu[6]

[1] *Institute of Epidemiology, College of Public Health (CPH), National Taiwan University (NTU), Taipei, Taiwan*
[2] *Inst. of Med. Tech., CM., NTU, Taipei, Taiwan*
[3] *Inst. of Med. Informatics, CM, Taipei Med. University, Taipei, Taiwan*
[4] *Department of Public Health, CPH, NTU, Taipei, Taiwan*
[5] *Taipei City Department of Health and Taipei Municipal United Hospital, Taipei, Taiwan*
[6] *Global Change Research Center, NTU and, Dept of Atmospheric Sciences, College of Science, NTU, Taipei, Taiwan*

Emerging and re-emerging infectious diseases can involve large at risk populations and lead to a rapid increase in case numbers or case fatalities. With movement from one part of the earth to another so convenient and frequent in today's world, cross-country and cross-continent spread of emerging infectious diseases (EID) has become more frequent. If control efforts are not made more effective and the EID are not more recognized, then epidemics of any infectious disease unbeknownst to the public at large can readily spread locally, nationally and internationally.

Taiwan has experienced several outbreaks of emerging and re-emerging infectious diseases, including stem encephalitis caused by enterovirus 71 (EV71) in 1998, dengue/dengue hemorrhagic fever (DHF) in Kaohsiung and Pingtung in 2001—2003, inter-hospital nosocomial spread of severe acute respiratory syndrome (SARS) in 2003, and island-wide avian influenza H5N2 during the winter season of 2003—2004. In order to face these challenges, a hospital emergency department-based syndromic surveillance system (ED-SSS) was established in Taiwan using a team of multi-disciplinary experts monitoring 11 syndromes, including fever, respiratory, influenza-like illness, asthma, upper and lower gastro-intestinal, enterovirus-related infection syndrome, skin, neurological, and syndrome for severe illness or deaths, on a daily basis (Wu TS and King CC et al., 2008). Using ED-SSS, the scale of red-eye epidemic was minimized after public education through immediate notifying parents by cellular phone.

To maintain preparedness for the possibility of pandemic influenza, our research activities have been expanded to include virologic and serologic surveillance of live-bird market personnel and poultry workers for avian influenza and on-going investigation of daily meteorological factors associated with outbreaks of low and high pathogenic avian influenza viruses (Liu CM and King CC, 2007).

In conclusion, integrated surveillance plus evidence-based epidemiologic data can help formulate better public health policies and increase preparedness to meet the future challenges presented by emerging/re-emerging infectious diseases.

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