Inconsistency of Timeliness in a Chief Complaint-Based Syndromic Surveillance System During Two Influenza Epidemic Seasons

Tao Tao*[1], Qi Zhao[1], Jun Zong[2], Xue Li[3], Vinod Diwan[4] and Biao Xu[1]

[1]School of Public Health, Fudan University, Shanghai, China; [2]Jiangxi CDC, Nanchang, China; [3]Future Position X, Gävle, Sweden; [4]Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden

Objective

To study and compare the timeliness of syndromic surveillance system for the early warning of infectious diseases among different epidemic seasons.

Introduction

Syndromic surveillance system has been developed and implemented all over the world, and many studies showed that syndromic data sources had improved timeliness towards traditional surveillance method in the early warning of some infectious disease epidemics. However, owing to the uncertainties of disease epidemic features, clinical manifestations and population behaviors, the early warning timeliness of syndromic data sources might change across time and population, and few studies had explored their consistency in different epidemic periods of infectious diseases.

Methods

We evaluated the timeliness of a chief complaint-based syndromic surveillance system established in two rural counties of Jiangxi Province, China, towards seasonal influenza epidemics. Weekly number of influenza-like illness (ILI) patients counted from syndromic surveillance system was compared with the weekly influenza virus positive rate (VPR) data collected from National Influenza Surveillance Network in Jiangxi Province using cross correlation method. Timeliness was defined as the lead weeks of ILI data towards VPR data when two data sources reached maximum correlation. Daily data check and quarterly field data quality control was conducted to ensure the correctness and completeness of data in syndromic surveillance system.

Results

From 18th week 2012 to 52nd week 2013, there were two influenza epidemic seasons in surveillance areas according to the VPR data from National Influenza Surveillance Network. Apparent correlation could be observed between ILI and VPR curves, and in some periods the ILI peaks occurred earlier than VPR peaks (Figure 1). Cross correlation study showed that in Epidemic Season 1, the subgroups of ILI data had 0~5 weeks'timeliness towards VPR data, with correlation coefficients between 0.52~0.84. ILI reported from upper-level health facilities (county and township hospitals), younger patient groups (3-17 years) had higher timeliness than ILI reported from village health stations, elder patient groups (18- years) (Table 1). The situation in Epidemic Season 2 were quite different that the correlations between ILI subgroups and VPR data were generally weaker than that in Epidemic Season 1, and some ILI subgroups even presented 1~5 weeks'delays towards VPR data. ILI reported from village health station, elder patient groups (18- years) had better timeliness than that from upper-level health facilities, younger patient groups (0-17 years) (Table 2). Lab data showed that the dominant influenza strains were different in two epidemic seasons.

Conclusions

The inconsistency of timeliness in syndromic surveillance system might be attributed to the differences in dominant strains, clinical manifestations of influenza, population age groups affected, and health seeking behaviors of influenza patients in two epidemic seasons. Further exploring the causes of these phenomena could help public health professionals select most timely data sources for the early warning of influenza epidemics in rural China.
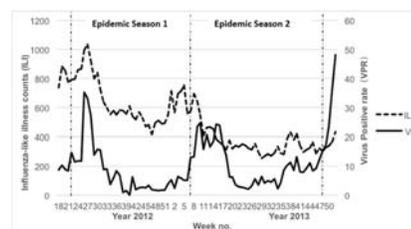

Figure 1 Time trend of ILI and VPR data, 2012 18th week to 2013 52nd week

Table 1 Cross-correlation study between ILI and VPR data in Epidemic Season 1

Maximum correlation coefficient	Lead weeks towards VPR data (Timeliness)						
Subgroups of ILI data	5	4	3	2	1	0	-1 -2 -3 -4 -5
ILI (All patients)				0.80899			
ILI (Initial visit)		0.82184					
ILI (Repeat visit)				0.84003			
ILI (County hospital)				0.81987			
ILI (Township hospital)			0.73297				
ILI (Village health station)						0.81676	
ILI (0-2 year)						0.7954	
ILI (3-4 years)		0.51832					
ILI (5-10 years)		0.80389					
ILI (11-17 years)	0.73143						
ILI (18-39 years)				0.79935			
ILI (40-64 years)					0.7879		
ILI (>64 years)						0.64325	

Table 2 Cross-correlation study between ILI and VPR data in Epidemic Season 2

Maximum correlation coefficient	Lead time towards VPR data (week)										
Subgroups of ILI data	5	4	3	2	1	0	-1	-2	-3	-4	-5
ILI (All patients)				0.62942							
ILI (Initial visit)					0.67298						
ILI (Repeat visit)			0.3214								
ILI (County hospital)								0.41188			
ILI (Township hospital)							0.4927				
ILI (Village health station)			0.73606								
ILI (0-2 year)									0.38835		
ILI (3-4 years)					0.66208						
ILI (5-10 years)					0.5765						
ILI (11-17 years)							0.49592				
ILI (18-39 years)		0.48877									
ILI (40-64 years)	0.82223										
ILI (>64 years)				0.76112							

Keywords

Timeliness; Syndromic surveillance; Epidemic season

*Tao Tao
E-mail: ttsuper2000@hotmail.com