

# Fever in Children - an Assessment of Validity by a Shewhart Model in a Syndromic Surveillance System in China

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## Objective

To evaluate the validity of a syndromic surveillance system in health facilities of rural China, signals generated by Shewhart charts from the reported febrile patients in children were compared with that from the common infectious disease patients reported to the conventional case report system (CISDCP, China Information System for Disease Control and Prevention)

## Introduction

Since April 2012, an integrated syndromic surveillance system in rural China (ISSC) has been established in health facilities in two rural counties of Jiangxi Province, China [1]. The objective of ISSC is to integrate syndromic surveillance with conventional case report system for the early detection of infectious disease outbreak in rural China.

## Methods

A total of 167 health facilities including 2 county hospitals, 15 township hospitals and 150 village health stations were sampled as surveillance sites in 2 counties in Jiangxi province, China. Health facility visits of patients with ten major symptoms including fever, cough, sore throat, diarrhea, and nausea/vomiting, together with their age and gender were reported to a web-based platform during April 2012 and March 2014. Data on children patients with CID common infectious diseases (CID) in these two counties reported to the CISDCP during the same period were retrieved including measles, hand foot mouth disease (HFMD), chickenpox, rubella, influenza, and mump. The time trend and alert signals in both ISSC and CISDCP were generated by Shewhart model [3] (baseline=15 days, lag= 2 days,  $\sigma=3$ ). Sensitivity and PPV were used to compare the signals generated in ISSC with that in CISDCP (using the signals in CISDCP as reference). A matched signal was defined as a signal generated in ISSC having at least one corresponding signal occurred in CISDCP within a duration of 7 days.

## Results

There were 28,049 and 42,029 reports respectively for febrile patients in children from health facilities in these two counties during the two-year period. According to the CISDCP, there were 511 and 1779 selected CID cases reported respectively (Table 1).

The time trend of febrile patients and CID patients with Shewhart signals were illustrated in Figure 1 and figure 2. The time trend of the two datasets generally matched to each other. However in Jan. 2014 there was a peak in febrile patients in ISSC with no observed changes in CIDs in CISDCP. The sensitivity were 29.03% and 34.78%. The PPVs were 64.29% and 53.33% in the two counties respectively. (Table 2.)

## Conclusions

Conclusion: The sensitivity of signals in the syndromic surveillance is relatively low using the Shewhart model. This might be the result

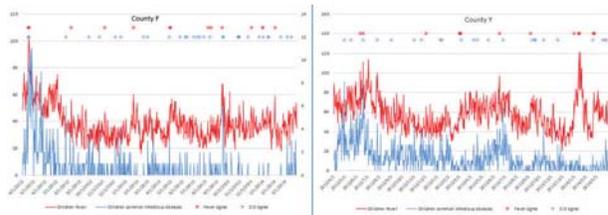
of using the non-specific symptom - fever. However PPV was relatively high in fever in ISSC for detecting CID within children using Shewhart model. These results suggested that this system had potential ability to supplement conventional case report system in detecting common infectious disease outbreaks in children, under the condition that every signal can be verified with high quality by local disease control workers.

Table1. Records of children febrile patients in ISSC and CID in CISDCP

County	ISSC		CISDCP				
	Fever	Rubella	Influenza	Mumps	HFMDs	Varicella	Total cases
County F	28049	3	14	37	374	83	511
County Y	42029	2	17	291	1242	227	1779

Table2. Numbers of signals generated by Shewhart model and sensitivity & PPV

County	Fever	CID	Matched	Sensitivity%	PPV%
County F	14	31	9	29.03	64.29
County Y	15	23	8	34.78	53.33



## Keywords

Syndromic surveillance; Shewhart model; children

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