Application of multiple seasonal ARIMA model in forecasting incidence of HFMD in Wuhan, China

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Background: During the last decades, outbreaks of hand-foot-mouth disease (HFMD) have been reported for many times in China. The prevention and control of it has become an issue. Presently, there are no specific treatments and specific antiviral drugs or vaccines available against non-polio enteroviruses causing HFMD. That means the risk of infection only can be reduced by good hygiene practices and early medical attention for children with severe symptoms. Therefore, early detection and response using mathematical statistics method during the epidemics will be helpful for policy-makers to generate preventive strategies.

Methods & Materials: We proposed a multiple seasonal autoregressive integrated moving average model, to forecast the expected incidence from April 2013 to September 2013 using the retrospective incidence from January 2008 to December 2012 as training set, and incidence from January 2013 to March 2013 as validation set obtained from China Information System for Disease Control and Prevention (CISDCP). All the procedures were implemented via SAS9.2 system.

Results: After one order of regular differencing and one order of seasonal differencing, the transformed series achieved stationary. The best fitted model was SARIMA with the lowest value of Bayesian Information Criterions (BIC). Model parameters had significant differences (P < 0.05) (Table 1) and the series of residuals considered to be white noise (=14.59, P > 0.05) (Table 2). This indicated that the best fitted model extracted the useful information of the series. Predictions and observations were very close to each other and showed a good forecasting performance.

Conclusion: The ARIMA model we proposed can be an effective way to forecast the incidence cases of HFMD. Detecting the outbreaks before they happened is the key point of the early detection and early warning, and that is also the main purpose of our study. The usefulness of forecasting expected incidence of HFMD performs not only in giving public-health officials a probable trend of the variability to be expected in the future, but also in detecting outbreaks and providing probability statements and guidance to policy makers.

Validation of hepatitis B surface antigen (HBsAg) rapid test to screen HBV infection in rural Gambia

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Background: Sub-Saharan Africa (SSA) is highly endemic for HBV infection; yet rapid tests for HBs Antigen (HBsAg) detection have been poorly validated. Here, using the field experience of the PROLIFICA programme, we assessed the performances of two HBsAg point-of-care tests (POC) at the community level, in the Gambia, West Africa

Methods & Materials: The PROLIFICA programme aims at screening and treating the population for HBV infection in West-Africa. In Gambian rural communities, we evaluated in parallel two POCs (Determine®(TM) and VIKIA®,) for HBsAg detection. Dried Blood Spots were also systematically collected during the screening and were used for Axsym HBsAg enzyme-linked immunosorbent assay (ELISA) for confirmation and comparison. Tests performances were based on Sensitivity (Se), specificity (Sp), positive and negative predictive values (PPV, NPV).

Results: 242 persons were screened in the field, 30 (12.4%) patients tested positive with both POCs. Only one participant had discordant rapid test results. Using Asyxm ELISA, 34(14%) were HBsAg-positive giving the following Se and Sp for Determine 88.2% and 99.0% respectively; and 91.2% and 99.0% for Vikia®. The negative predictive values for both tests exceeded 98%.

Conclusion: In this African rural setting, Determine and Vikia tests showed slightly lower performances than expected. However, both tests seem to be sensitive enough to screen easily and quickly the population for HBV infection in high endemic African settings. These cheap tests may pave the way for better access to care and treatment in highly endemic African poor settings.