Syndromic Surveillance for a Large Respiratory Disease Outbreak by Legionella in the Netherlands

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OBJECTIVE

To evaluate the added value of a syndromic surveillance system in detecting a large severe respiratory disease outbreak with a point-source we used the Legionnaires' disease (LD) outbreak of 1999 in the Netherlands as a case-study. We retrospectively simulated a prospective syndromic surveillance for space-time clusters of patients with pneumonia in hospital records to detect the LD outbreak.

BACKGROUND

In March 1999, a large outbreak of Legionnaires' disease occurred among persons that had visited a flower show held from February 19 to 28 in the Netherlands. Ten patients with severe pneumonia were admitted to one hospital in the region of the flower show between March 7 to 11. By March 11, six patients were diagnosed with Legionnaires' disease and an alarm notice was given to hospitals and GP's in the region. This was 14 days after the first case of pneumonia was diagnosed, and at the time 71 patients had already been hospitalized with pneumonia. Follow-up investigation revealed that of 77,061 visitors to the flower show, 188 had become ill, 167 (87%) were hospitalized and 21 (11%) died. As part of ongoing studies into sensitivity and specificity of syndromic analysis of routinely available datasets, we used this outbreak as a positive control, i.e. an example of a large regional respiratory disease outbreak with a point-source. Using a syndromic approach we did a space-time analysis of hospital records to determine whether this outbreak would have been detected by syndromic surveillance.

METHODS

Hospital discharge diagnoses for all of 1999, (coverage: 99%) were retrospectively analyzed by date of hospitalization to evaluate their value for detecting the LD outbreak. We included all patients with any form of pneumonia as main or secondary diagnosis – which is assumed to be a realistic reflection of the possible diagnostic coding on the day of hospitalization. We used scan-statistics (Satscan), based on a space-time permutation model, to detect clusters in space and time in the nationwide hospital records of patients with pneumonia. We simulated a prospective setting by running the scan-statistic for each day after the flower show started. We used the scan-statistic corrected for age and adjusted for purely temporal clusters. Detection was independent of the distribution of patients over (regional) hospitals, since we used municipal postal codes of the pneumonia patients for the spatial coordinates.

RESULTS

Figure 1 illustrates the nationwide temporal trend by day of hospitalization of all patients with pneumonia (blue line) and of LD patients (pink line = main discharge diagnosis "pneumonia by a specific infectious disease" which includes LD). On March 10 the scan-statistic gave the first significant cluster within all pneumonia patients in a region around the flower show (p 0.031). On March 11, the same day the outbreak was detected, the p value was 0.002. There are also a modest number of yet unexplained clusters ($p < 0.05$) detected. Possibly these are false alarms or spatial influenza elevations during the influenza season. The balance between false alarms and actual alarms is being further investigated.

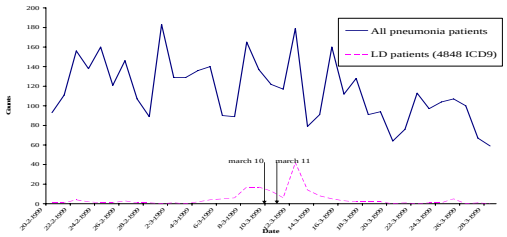

Figure 1 – Daily hospitalizations in the Netherlands.

CONCLUSIONS

Syndromic surveillance with a scan statistic can detect a severe respiratory disease outbreak with a point-source in a timely fashion independent of detecting the causative agent.

REFERENCES

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