Validity of electronic surveillance systems: a systematic review
Leal J, Laupland KB

CRD summary
This review concluded that electronic surveillance had moderate to excellent utility compared with conventional methods for nosocomial infections. These conclusions were supported by the results presented, but should be interpreted with some caution due to the lack of details on study quality and possibility of publication bias.

Authors' objectives
To compare the utility of electronic and conventional surveillance methods for infections.

Searching
PubMed and EMBASE were searched from 1980 to September 2007. Search terms were reported. Reference lists of evaluated articles and the authors' files were screened. No language restrictions were applied. The review was restricted to published studies.

Study selection
Prospective or retrospective studies that compared electronic and traditional surveillance systems for management of any type of infectious disease were eligible for inclusion. Electronic surveillance was defined by use of existing routine electronic databases. Traditional surveillance systems were broadly defined as those that relied on individual case-finding through notifications and/or review of clinical records by healthcare professionals. No restrictions were placed on population or setting. Studies had to report sufficient data to calculate sensitivity, specificity, or positive (PPV) or negative (NPV) predictive values.

Included studies focused mainly on nosocomial infections (surgical site infections, central venous catheter related infections, postpartum infections, blood-stream infections, pneumonia and urinary tract infections); three studies assessed community acquired infections. Two studies assessed nosocomial outbreaks/cluster rather than individual cases. Electronic surveillance methods involved laboratory and/or administrative data. Administrative data consisted for discharge coding, pharmacy and claims databases. Conventional surveillance systems served as the reference standard against which performance of the electronic surveillance system was assessed. Studies were conducted in tertiary care hospitals, acute care hospitals, paediatric hospitals, teaching hospitals, health management organisations and the community.

Studies were assessed for inclusion by one reviewer and checked by a second. Disagreements were resolved by consensus.

Assessment of study quality
The authors did not state that they assessed study quality.

Data extraction
One reviewer extracted data on sensitivity, specificity and predictive values using a standardised form. Extraction was reviewed by a second reviewer.

Methods of synthesis
A narrative synthesis was presented with results grouped according to type of infection and surveillance data. Differences were discussed in the text and study details were tabulated.

Results of the review
Twenty four studies were included in the review (n=48,977).

Laboratory based surveillance for nosocomial infections (eight studies, n=16,485): Sensitivity ranged from 63% to 91% and specificity from 87% to 100% (based on seven studies). One study provided data only on the positive predictive
value.

Administrative data-based surveillance or nosocomial infections (seven studies, n=19,692): Sensitivity ranged from 59% to 96% and specificity from 95% to 100% (based on five studies). Two studies provided data only on the positive predictive value.

Administrative and laboratory based surveillance for nosocomial infections (six studies, n=7,589): Sensitivity ranged from 71% to 94% (based on four studies) and specificity from 47% to 100% (based on five studies). One study provided data only on the positive predictive value.

Electronic surveillance for community-onset infection (three studies, n=5,211): Sensitivity ranged from 68% to 100% and specificity from 75% to 98% (based on two studies). One study provided data only on the positive predictive value.

Authors' conclusions
Electronic surveillance had moderate to excellent utility compared with conventional methods for nosocomial infections.

CRD commentary
The review addressed a broad question with defined inclusion criteria. The literature search was adequate for published studies, but restriction of the review to published studies raised the possibility of publication bias. Some steps were taken to minimise reviewer bias and error in study selection and data extraction. Study quality was not formally assessed or discussed and so the reliability of the included studies was unclear. A narrative synthesis appeared appropriate given the differences between studies. Results were clearly summarised in tables. The authors' conclusions were supported by the results presented, but should be interpreted with some caution due to a lack of details on study quality and possibility of publication bias.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that future studies were needed to refine algorithms (especially with community acquired infections) and to implement and evaluate their effectiveness in comparison with conventional methods.

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