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Evaluation of the Reporting Validity of Central Line–Associated Bloodstream Infection Data to a Provincial Surveillance Program

To the Editor—Periodic evaluation of the validity of data submitted to regional and/or national central line–associated bloodstream infection (CLABSI) surveillance programs is crucial to ensure their scientific credibility and to identify methodological problems.[1-3] In 2003, the Surveillance Provinciale des Infections Nosocomiales–Bactériémies Associées aux Cathéters Centraux (SPIN-BACC) program was launched in the province of Quebec with the purpose of providing provincial benchmarks and data for the planning of provincial infection control interventions.[4,5] Given its importance, we aimed to evaluate the accuracy of CLABSI reporting to SPIN-BACC.

We included 14 SPIN-BACC intensive care units (ICUs) that had reported 3 or more CLABSIs during at least 11 consecutive 4-week periods between April 1, 2008, and March 31, 2009. The SPIN-BACC surveillance methods have been described in detail elsewhere.[6,7] This project was approved by the McGill University Institutional Review Board and by the directors of professional services of all participating institutions. Participating ICUs provided a list (data set 1) containing all CLABSIs (see definitions in Table 1) reported to SPIN-BACC for the year under study, as well as a second list (data set 2) of all ICU BSIs that occurred during the same period but were not classified as CLABSI by the local surveillance teams. We selected a random sample of cases from data sets 1 and 2, stratified by ICU and proportional to the number of CLABSIs reported to SPIN-BACC during the study period.

Two previously trained independent researchers (P.S.F. and I.R.) blinded to patients' CLABSI status reported to SPIN-BACC reviewed the included charts. The reviewers' adjudication of CLABSI status was defined as our reference standard. In case of discrepancies between the 2 reviewers, the opinion of a third researcher (C.Q.), an infectious disease/medical microbiologist specialist with expertise in CLABSI surveillance, was sought.

As measures of validity, we computed sensitivity and specificity and their respective exact binomial 95% confidence intervals (CIs). Sample size (90 charts) was calculated using the width of the 95% CI (75%–95%) that we aimed to obtain for a SPIN-BACC hypothesized sensitivity of 85% (similar to the sensitivity published by the National Nosocomial Infections Surveillance [NNIS] system in 1998).[8] To achieve the necessary numbers of true positives (45) and true negatives (45), we reviewed a total of 109 charts.

Data sets 1 and 2 included a total of 138 reported CLABSIs (68% of cases reported and 52% of catheter-days in 2008–2009) and 419 non-CLABSI cases, respectively. We randomly sampled 57 reported CLABSI cases and 52 non-CLABSI cases to be reviewed. We identified 5% more CLABSI cases (60) and 6% fewer non-CLABSI cases (49) than were reported. Overall, 21% of the charts (23) needed to be discussed for a consensus to be reached.

Of the 57 CLABSI cases reviewed, only 4 (7%) were classified as false positives. Of the 52 non-CLABSI cases that were reviewed, 7 (13%) were classified as false negatives. False-positive and false-negative cases were equally distributed among hospitals. Calculated sensitivity and specificity were 88% (95% CI, 77%–95%) and 92% (95% CI, 80%–98%), respectively.

Of the 7 false-negative cases, 3 (43%) were found to be CLABSI according to NNIS criterion 2b, 2 (29%) according to criterion 2a, and 2 (29%) according to criterion 1.[6] Of the 4 false-positive cases, 2 (50%) did not fulfill NNIS criteria for bloodstream infection, and 2 (50%) had another source of infection.

Our study showed that CLABSI data reported by the ICUs participating in SPIN-BACC are valid. Our estimated sensitivity compares to the one reported by the NNIS system (85%) in 1998 and is above the sensitivity reported by KISS (Germany, 66%) and NSIH (Belgium, 59.3%).[8] However, our specificity is still mildly lower compared with these national programs (92% vs 98.3%–99.4%).

Compared with other jurisdiction-wide programs, SPIN-BACC results are superior. Sensitivity and specificity reported by Backman et al[7] (Connecticut, United States) were 48% and 99%, respectively, and McBryde et al[9] (Victoria, Australia) reported 61% and 70%, respectively. In both cases, the low sensitivity was attributed to misinterpretation of NNIS criterion 2b for CLABSI.[6] Although we used this criterion for CLABSI diagnosis until 2010 and, thus, during the study period, its interpretation was not problematic, as only 4 (10.2%) of the 39 criterion 2b CLABSIs were misclassified.

We believe our results are a reflection of the use of sound surveillance methods, which are based on the NHSN system, the effectiveness of the training offered to the participants, and

TABLE 1. Definitions Used in the SPIN-BACC Program (2003–2010)

Terms	Definition
BSI (primary)	Organism cultured is not related to an infection at another site AND *a.* Patient has a recognized pathogen cultured from ≥1 blood culture OR *b.* Patient has ≥1 of a set of signs/symptoms (ie, fever [>38°C], chills, hypotension or hypothermia [<37°C], apnea, or bradycardia if patient is ≤1 year old) AND a common skin contaminant (eg, diphtheroids, *Bacillus* spp., *Propionibacterium* spp., coagulase-negative staphylococci, or micrococci) is cultured from ≥2 blood cultures OR *c.* Patient has ≥1 of a set of signs/symptoms (ie, fever [>38°C], chills, hypotension or hypothermia [<37°C], apnea, or bradycardia if patient is ≤1 year old) AND a common skin contaminant is cultured from ≥1 blood culture if appropriate antimicrobial therapy is initiated by the treating physician[a]
CLABSI	Presence of a CVL on diagnosis of BSI or in the 48 hours before diagnosis
ICU-acquired CLABSI	CLABSI acquired during ICU admission (ie, CLABSI was not present or incubating at the time of ICU admission); CLABSI onset is defined as the time when the first clinical evidence is observed or when the blood culture becomes positive, whichever comes first

NOTE. BSI, bloodstream infection; CLABSI, central line–associated BSI; CVL, central venous line; ICU, intensive care unit; SPIN-BACC, Surveillance Provinciale des Infections Nosocomiales–Bactériémies Associées aux Cathéters Centraux.

[a] Definition was changed in April 2010 to requiring at least 2 positive blood cultures if a skin commensal was isolated.

the quality assurance/control systems in place.[4] To minimize outcome misclassification, 4 data adjudications are performed during each surveillance year. Furthermore, additional training is offered to participants at SPIN-BACC biannual meetings.

The use of a retrospective chart review as the reference standard is a limitation of our study. However, both reviewers felt that they were able to retrieve all the information needed for the diagnosis of CLABSI cases. In addition, despite blinding it is possible that reviewers' CLABSI diagnosis was influenced by a residual degree of subjectivity. We tried to minimize this problem by using a third blinded researcher in the case of discrepancies between reviewers. Finally, because of feasibility issues we included only university-affiliated hospitals from the greater Montreal area. Nevertheless, our sample represented the majority of CLABSI cases and catheter-days reported in 2008–2009.

In conclusion, our study showed that data reported to SPIN-BACC are valid and that our benchmarks accurately represent the CLABSI problem in the province of Quebec. Investments in the continuing education and training of hospital-based infection control practitioners and in quality assurance, as well as periodic evaluations, are crucial to maintain the high quality of this program.

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Avian Ecto Parasite Infestation in the Hospital

To the Editor—This is to add on to the interesting article by Munoz-Price et al[1] on bed bugs in the healthcare sector, published in the November 2012 issue of *Infection Control and Hospital Epidemiology.* Infestation with pests is rarely reported in the healthcare sector, and such reports are even less common in a country like India, where the capture of healthcare-associated infection data is itself a challenge. We report here 2 episodes of pigeon mite infestation at our institute.

Operation theatre (OT) technicians informed the infection control team of severe itching after putting on OT uniforms. Ten members of the staff had severe skin allergy (urticaria), and 1 staff member had anaphylactic (asthma-like) symptoms that required treatment by OT doctors. On close examination, several uniforms revealed small mites crawling all over the linen, which we identified as the pigeon mite (Figure 1). We traced the source of infestation to pigeon droppings that had entered the staff room through a crack in the roof. The area above the roof was open, and pigeons had access to this area. Recently, this area had been cleaned as a part of regular maintenance.

An emergency meeting was held with the relevant staff (housekeeping, maintenance, and laundry staff and management personnel). The staff room was vacated, the roof was repaired, and the area was washed with soap and water and disinfected with bleach. This cleaning was done repeatedly over a 1-week period to ensure that no remnants of pigeon droppings remained. All of the uniforms were sent to the laundry. We could control this menace by following the basic principles of hygiene and disinfection.

A second episode occurred 6 months later. Similar complaints were received from staff members who experienced allergic reactions subsequent to changing bed sheets in a patient room. On examination, a line of mites was discovered making their way down the wall to the bed from the air conditioning duct. On inspection, pigeon droppings were found in the duct. Pigeons had accesses to the duct through

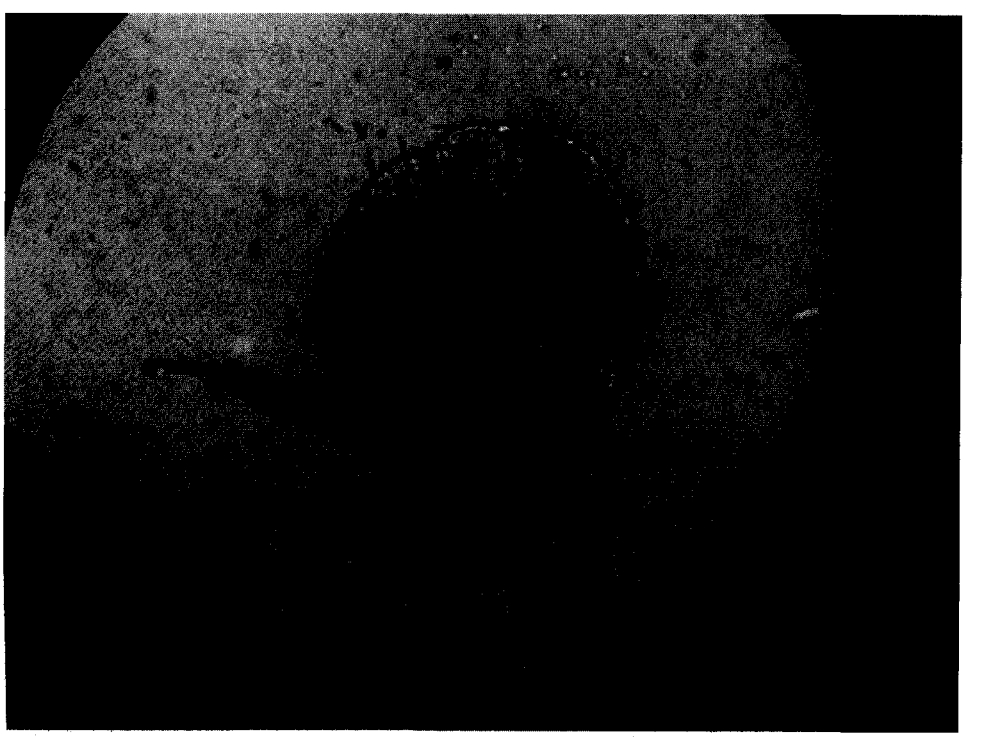

FIGURE 1. Picture of a pigeon mite.

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