International Nosocomial Infection Control Consortium (INICC) report, data summary for 2003-2008, issued June 2009

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We report the results of the International Infection Control Consortium (INICC) surveillance study from January 2003 through December 2008 in 173 intensive care units (ICUs) in Latin America, Asia, Africa, and Europe. During the 6-year study, using Centers for Disease Control and Prevention (CDC) US National Healthcare Safety Network (NHSN; formerly the National Nosocomial Infection Surveillance system [NNIS]) definitions for device-associated health care-associated infection, we collected prospective data from 155,358 patients hospitalized in the consortium's hospital ICUs for an aggregate of 923,624 days. Although device utilization in the developing countries' ICUs was remarkably similar to that reported from US ICUs in the CDC's NHSN, rates of device-associated nosocomial infection were markedly higher in the ICUs of the INICC hospitals: the pooled rate of central venous catheter (CVC)-associated bloodstream infections (BSI) in the INICC ICUs, 7.6 per 1000 CVC-days, is nearly 3-fold higher than the 2.0 per 1000 CVC-days reported from comparable US ICUs, and the overall rate of ventilator-associated pneumonia (VAP) was also far higher, 13.6 versus 3.3 per 1000 ventilator-days, respectively, as was the rate of catheter-associated urinary tract infection (CAUTI), 6.3 versus 3.3 per 1000 catheter-days, respectively. Most strikingly, the frequencies of resistance of *Staphylococcus aureus* isolates to methicillin (MRSA) (84.1% vs 56.8%, respectively), *Klebsiella pneumoniae* to ceftazidime or ceftriaxone (76.1% vs 27.1%, respectively), *Acinetobacter baumannii* to imipenem (46.3% vs 29.2%, respectively), and *Pseudomonas aeruginosa* to piperacillin (78.0% vs 20.2%, respectively) were also far higher in the consortium's ICUs, and the crude unadjusted excess mortalities of device-related infections ranged from 23.6% (CVC-associated bloodstream infections) to 29.3% (VAP).

Key Words: Hospital infection; nosocomial infection; health care-associated infection; INICC; International Nosocomial Infection Consortium; device-associated infection; antibiotic resistance; ventilator-associated pneumonia; catheter-associated urinary tract infection; central line-associated bloodstream infections; bloodstream infection; urinary tract infection; developing countries; limited resources countries; low income countries; network.

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For a list of members of the International Nosocomial Infection Control Consortium, see Appendix 1 available online at www.ajicjournal.org.

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This report is a summary of data on device-associated infections (DAI) within intensive care units (ICUs) collected by hospitals participating in the International Nosocomial Infection Control Consortium (INICC)[1-13] between January 2003 and December 2008.

The INICC is an international nonprofit, open, multicenter, collaborative health care-associated infection control program with a surveillance system based on that of the US National Healthcare Safety Network (NHSN; formerly the National Nosocomial Infection Surveillance system [NNIS]).[3] Founded in Argentina in 1998, the INICC is the first multinational research network established to control and reduce DAI through the analysis of data collected on a voluntary basis by a pool of hospitals worldwide. The INICC has the following goals: Create a dynamic global network of hospitals in the developing world that conducts surveillance of health care-associated infections (HAIs) using standardized definitions and established methodologies, promote implementation of evidence-based infection control practices, and carry out applied infection control research; provide training and surveillance tools to individual hospitals that can allow them to conduct outcome and process surveillance of HAIs, measure their consequences, and assess the impact of infection control practices; to improve the safety and quality of health care worldwide through implementation of systematized programs to reduce rates of HAI, associated mortality, excess lengths of stay, excess costs, and bacterial resistance.

METHODS

The INICC at this time has focused on surveillance and prevention of DAI in adult and pediatric ICUs and high-risk nurseries.[3] The data are collected using standardized CDC NNIS/NHSN protocols and definitions.[14-16]

The INICC has both outcome surveillance and process surveillance components. The modules of the components may be used singly or simultaneously, but, once selected, they must be used for a minimum of 1 calendar month.

All DAIs of the Outcome Surveillance Component, are categorized using standard CDC NNIS definitions that include laboratory and clinical criteria. Both laboratory-confirmed bloodstream infections (BSIs) and clinical sepsis without microbiologic confirmation of BSI are recorded and reported.[15]

Within the Outcome Surveillance Component, data are classified into specific module protocols addressing the following: DAI rates: excess length of stay, evaluation of HAI costs, crude excess mortality, microbiologic profile, bacterial resistance, and antimicrobial-use data. In addition, INICC methodology includes a process for adjudication of and validation of reported HAIs.[3]

Infection control professionals (ICPs) collect data on central line-associated primary bloodstream infections (CLABs), catheter-associated urinary tract infections (CAUTIs), and ventilator-associated pneumonias (VAPs) occurring in patients hospitalized in a specific patient care location, in nearly all hospitals. ICUs are stratified according to the patient population: adult, pediatric, or neonatal units (NICUs).

All NICUs are level III or level II/III units, and ICPs collect data on CLABs and umbilical catheter-associated primary BSIs or VAPs for each of 5 birth-weight categories ($<$750 g, 750-1000 g, 1001-1500 g, 1501-2500 g, $>$2500 g). Corresponding denominator data, patient-days, and specific device-days are also collected.

Small proportion of hospitals, with previous long-lasting experience conducting surveillance of DAIs, sent aggregated data to the INICC. Original and aggregated data were collected to calculate DAI rates. Only original data were collected to calculate mortality and lengh of stay.

The Process Surveillance Component includes the following modules: hand hygiene compliance monitoring in ICUs; central and peripheral vascular catheter care compliance monitoring; urinary catheter care compliance monitoring; monitoring of compliance with measures to prevent VAP; and performance feedback. Data from the Process Surveillance Module on hand hygiene compliance are included in this report. The identity of all INICC hospitals, cities, and countries is confidential, in accordance with the INICC charter.

RESULTS

Characteristics of 173 ICUs from 25 countries in Latin America, Asia, Africa, and Europe currently participating in the INICC that contributed data for this report are shown in Table 1. The participation of hospitals on the INICC Program is as follows: mean length of participation $\pm$ SD, 22.9 $\pm$ 21.6 months, range 1 to 72 months. One hundred thirty-nine out of 173 (81%) of ICUs collected and sent original data to INICC headquarters, and 34 out of 173 (19%) of ICUs collected and sent aggregated data to INICC headquarters. Original and aggregated data were used to calculate DAI rates. Only original data were used to calculate mortality and lengh of stay.

For the Outcome Surveillance Component, DAI rates, device utilization (DU) ratios, crude excess mortality by specific type of DAI, antimicrobial utilization, and bacterial resistance for January 2003 through December 2008 are summarized (Tables 2-17).

Tables 2-7 show DAI rates and DU ratios by infection type (CLAB, CAUTI, VAP) in adult and pediatric ICUs. The data were not stratified by type or size of hospital.