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### **Effectiveness of Outcome and Process Surveillance for Reducing Urinary Tract Infection Rates in 42 ICUs from 11 Countries. Findings of the International Nosocomial Infection Control Consortium (INICC).**

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#### **Abstract:**

**Objectives:** To determine the effect of outcome and process surveillance (intervention) on the rate of urinary catheter-associated urinary tract infection (CAUTI) in 42 intensive care units (ICU) from Argentina, Brazil, Colombia, Cuba, India, Macedonia, Mexico, Morocco, Peru, Philippines and Turkey.

**Methods:** An open label, prospective cohort, active CAUTI surveillance, sequential study was conducted on adult and pediatric patients admitted to tertiary-care ICUs. Rates of CAUTI were recorded through applying the definitions provided by CDC-NNIS system. The protocol, forms, and outcome and process surveillance methodology implemented were developed by the INICC. The data collection was performed in the participating ICU. Data uploading and data analysis were conducted at the INICC headquarters on proprietary software. The hand hygiene compliance and CAUTI rates during baseline were compared to the rate during an intervention period.

**Results:** The baseline period included the first four months of each medical center in the study; the intervention period lasted a mean of 18 months (range 4-50 months).

During the baseline period, 4,156 ICU patients were enrolled, and 22,532 during the intervention period. Patient's characteristics were similar over the two periods (Patient gender,  $P = 0.6572$ ; Diabetes,  $P = 0.3999$ , Cancer,  $P = 0.7578$ , Renal Impairment =  $0.0889$ , Abdominal Surgery,  $P = 0.5581$ ; Trauma =  $0.6592$ , Previous Infection,  $P = 0.2741$ )

Hand-hygiene compliance improved from baseline to intervention period (52.6% vs 59.3% [RR= 1.13, 95% CI = 1.09 - 1.16,  $P = 0.0001$ ]). The percentage of urinary catheters inserted without strangulating) also improved (92.5% vs. 99.6% [RR= 1.08, 95%CI = 1.06 - 1.10,  $P = 0.0001$ ])

The rate of CAUTI per 1,000 urinary catheters days during the intervention period was significantly lower than during the baseline period, 9.1 (177/19,514) vs 6.1 (601/98,706) CAUTI per 1000 urinary catheter days (RR = 0.67, 95% CI = 0.57 - 0.79,  $P$ -value = 0.0001).

The incidence of antibiotic-resistant microorganism was also reduced: Imipenem resistant *Pseudomonas* sp (50.8% vs 38.8%, RR = 0.76, 95% CI = 0.61 - 0.95,  $P = 0.0175$ ); piperacilene-resistant *Pseudomonas* sp (58.3% vs 40.2%, RR = 0.69, 95% CI = 0.54 - 0.89,  $P = 0.004$ ), and Third-generation cephalosporin resistant

*Escherichia coli* (75.3% vs 48.5%, RR= 0.64, 95% CI = 0.52 - 0.80, P = 0.0001). Rates of antibiotic-resistant microorganisms by 1,000 bed days were also reduced: piperacilin-resistant *Pseudomonas* was reduced from 2.97 to 1.62 per 1,000 bed days (RR = 0.54, 95% CI = 0.42 - 0.70, P = 0.0002), ceph3-resistant *Klebsiella* sp was reduced from 4.74 to 3.76 (RR= 0.79, 95% CI = 0.65 - 0.96, P = 0.0186) and ceph3-resistant *E.coli* from 4.15 to 1.88, (RR = 0.45, 95% CI = 0.36 - 0.56, P = 0.0001).

**Conclusions:** Outcome and process surveillance resulted in a significant improvement of hand hygiene compliance and catheter care, and a 33% reduction of the CAUTI rate and bacterial resistance in ICUs of 11 developing countries.