



# Device-associated hospital-acquired infection rates in Turkish intensive care units. Findings of the International Nosocomial Infection Control Consortium (INICC)

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**KEYWORDS**

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**Summary** We conducted a prospective study of targeted surveillance of healthcare-associated infections (HAIs) in 13 intensive care units (ICUs) from 12 Turkish hospitals, all members of the International Nosocomial Infection Control Consortium (INICC). The definitions of the US Centers for Disease Control and Prevention National Nosocomial Infections Surveillance System (NNISS) were applied. During the three-year study, 3288 patients for accumulated duration of 37 631 days acquired 1277 device-associated infections (DAI), an overall rate of 38.3% or 33.9 DAIs per 1000 ICU-days. Ventilator-associated pneumonia (VAP) (47.4% of all DAI, 26.5 cases per 1000 ventilator-days) gave the highest risk, followed by central venous catheter (CVC)-related bloodstream infections (30.4% of all DAI, 17.6 cases per 1000 catheter-days) and catheter-associated urinary tract infections (22.1% of all DAI, 8.3 cases per 1000 catheter-days). Overall 89.2% of all *Staphylococcus aureus* infections were caused by methicillin-resistant strains, 48.2% of the Enterobacteriaceae isolates were resistant to ceftriaxone, 52.0% to ceftazidime, and 33.2% to piperacilin–tazobactam; 51.1% of *Pseudomonas aeruginosa* isolates were resistant to fluoroquinolones, 50.7% to ceftazidime, 38.7% to imipenem, and 30.0% to piperacilin–tazobactam; 1.9% of *Enterococcus* sp. isolates were resistant to vancomycin. This is the first multi-centre study showing DAI in Turkish ICUs. DAI rates in the ICUs of Turkey are higher than reports from industrialized countries.

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## Introduction

Industrialized countries such as UK, USA, and others have adopted standards of institutional hospital-acquired infection surveillance and infection control.<sup>1,2</sup> The Centers for Disease Control and Prevention (CDC) Study of the Efficacy of Nosocomial Infection Control (SENIC) have showed the efficacy of surveillance to help to prevent healthcare-acquired infections (HAIs).<sup>3</sup>

A growing body of literature shows that HAIs are the major cause of patient morbidity and mortality in developed countries.<sup>4</sup> Device-associated infections (DAIs) represent the greatest threat in the ICU.<sup>5</sup> Surveillance of HAI has been well standardized by the CDC's Nosocomial Infection Surveillance System (NNISS).<sup>6</sup> Targeted surveillance and calculation of DAI rates per 1000 device-days allow benchmarking between similar institutions. Developed countries are major providers of most of the published studies of ICU-acquired infection,<sup>1,2,7</sup> whereas, developing countries provide relatively little data,<sup>8–10</sup> especially regarding DAI rates using standardized definitions.

The Turkish health system serves a population of 70 million, and hospital size varies from 50 to

1200 beds. Most are public hospitals, and approximately 10% are private. Generally, hospital and doctor-provided medical care are free of charge.<sup>11</sup> Establishing an infection control committee became a requirement in 1974 and regulations for general infection control policies in hospitals were published in 1983.<sup>11,12</sup> Hospital infection control has been performed in Turkey for the last 30 years. The structure and function of infection control committees and surveillance of hospital infections have been well defined, but the implementation of these efforts has not succeeded at a national level.<sup>13</sup> In 2005, hospital infection control committees were set up voluntarily together with the new governmental regulations for hospital infection control. From then on, all hospitals had to have a hospital infection control committee. Additionally, local guidelines, such as prevention of intravascular catheter-related infection<sup>14</sup> and prevention of urinary catheter-related infections,<sup>15</sup> have been published recently. A national project called NosoLINE, which was created in 1996, showed that the incidence of HAI varies from 1.0 to 8.6%, with most HAIs occurring in the ICU.<sup>13</sup> In Turkey a 1-day point prevalence study was carried out in 56 ICUs. A total of 115 patients (48.7%) had

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