

# ***Comparison of Healthcare-related Infection Rates Based on the National Nosocomial Infections Surveillance System of Turkey Diagnostic Criteria Reported in 2010 and Centers for Disease Control and Prevention Reported in 2014 in A Tertiary Hospital***

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## **Abstract**

**Objective:** Surveillance rates of infections in the hospitals may be affected based on the recent changes in the definitions of healthcare-associated infections (HAI) published in January 2014 by Centers for Disease Control and Prevention (CDC). In this study, effects of implementing two different infection control diagnostic criteria [CDC diagnostic criteria of HAI reported in 2014 and National Nosocomial Infections Surveillance System (NNIS) of Turkey diagnostic criteria reported in 2010] on the rates of HAI were compared.

**Material and Methods:** This study was conducted in the premature clinic of Dr. Behçet Uz Children's Hospital.

**Results:** In our hospital, a total of 85 and 46 patients were diagnosed with HAI based on the NNIS of Turkey and CDC diagnostic criteria, respectively. Although rates of HAI were less reported based on the recent CDC criteria than the old CDC criteria, the rates of central catheter-related blood- stream infections (BSI) and umbilical catheter-related BSI were reported more according to the new CDC criteria.

**Conclusion:** It should be borne in mind that increase in the HAI rates after implementing the new diagnostic criteria during the first 3 months may indicate problems related to healthcare practice; this increase should also be because of the changes between the criteria. (*J Pediatr Inf 2016; 10: 6-9*)

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## **Introduction**

The nosocomial infections as an important healthcare problem in Turkey just like all over the world are one of the diseases that can be reduced clearly and are preventable when necessary precautions are taken. Nosocomial infection-related morbidity and mortality and increasing costs of treatment require the implementation of infection control strategies. It enables to develop the right strategies if every center knows their own patient profile, the microorganisms comprising the

hospital flora, their resistance patterns, and the distribution and frequency of nosocomial infections in every section. Surveillance underlies the efforts of battle against nosocomial infections. One of the elements of surveillance is the definition of infection categories. The reliability of data obtained over time and their comparison with the previous data or those in other centers requires a consensus on the definition (1).

The case definitions used in the surveillance of healthcare-associated infections were initially developed by the "Centers for Disease Control



and Prevention (CDC)" in 1987 in the United States of America (USA) and as of January 1988, they started to be implemented in the surveillance practices conducted in the hospitals as part of the "National Nosocomial Infection Surveillance (NNIS)" (2, 3). The diagnostic criteria composed by CDC in January 1988, were revised in 1992, 2002, 2008, 2013 and lastly in January 2014. Due to the changing CDC definitions in January 2014, it is possible that centers will have differences in their infection rates in their surveillance studies. In this study, the effects of the practice of 2014 CDC Healthcare-Associated Infection Diagnosis Criteria and the former criteria of 2010 National Nosocomial Infections Surveillance Diagnosis Criteria of Turkey and 2009 Intravascular Catheter-Related Bloodstream Infection diagnosis guide on the nosocomial infection rate were investigated (2, 4-6). Following the completion of our study, the infection diagnosis criteria were revised again by the CDC in January and April 2015 (7).

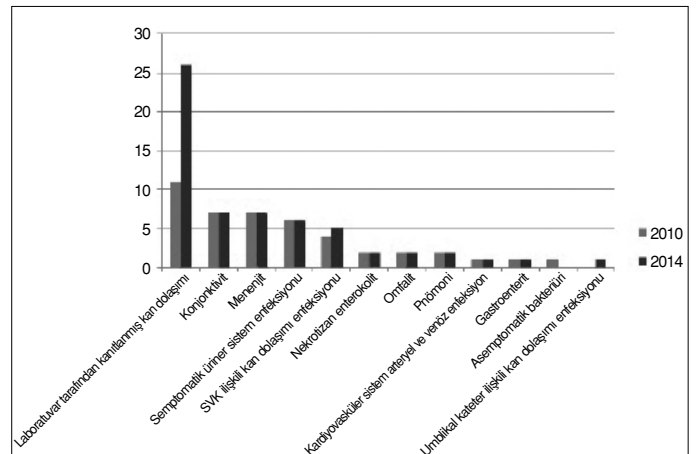
## Materials and Method

This study was conducted in premature clinic of Dr. Behçet Uz Children's Hospital. Premature Clinic is a 24-bed tertiary intensive care unit. In the unit, the diagnosis of healthcare-associated infections that occurred between 01.01.2014-31.12.2014 were made according to the January 2015 Diagnosis Criteria (new) (2, 4) of the Centers for Disease Control and Prevention (CDC) and 2010 National Nosocomial Infections Surveillance Guide of Turkey (old) (5).

## Results

Throughout the study, 407 patients were admitted to our clinic and 4693 hospital days were determined. While the umbilical catheter-use-day was 23, central catheter-use-day was 401. According to the 2010 National Nosocomial Infections Surveillance Guide of Turkey (5), 85 healthcare-associated infection diagnoses were made in our clinic. It was observed that clinical sepsis took the first place with 48.2% (n=41). Distribution of other infections were composed of; laboratory proven bloodstream infection 12.9% (n=11), conjunctivitis 8% (n=7), meningitis 8% (n=7), symptomatic urinary tract infection 7% (n=6), central catheter-related bloodstream infection 5% (n=4), necrotizing enterocolitis 2% (n=2), omphalitis 2% (n=2), pneumonia 2% (n=2), cardiovascular system arterial and venous infections 1% (n=1), gastroenteritis 1% (n=1) and asymptomatic bacteriuria 1% (n=1) (Figure 1).

According to the January 2014 criteria of CDC (2, 4), on the other hand, 46 healthcare-associated diagnosis were made. Distribution of other infections were



**Figure 1.** Distribution of the infections in our hospital according to the 2010 and 2014 CDC guidelines

composed of; bloodstream infection proven by the laboratory 26% (n=26), conjunctivitis 15% (n=7), meningitis 15% (n=7), symptomatic urinary tract infection 7% (n=6), central catheter-related bloodstream infection 11% (n=5), necrotizing enterocolitis 2% (n=2), omphalitis 2% (n=2), pneumonia 2% (n=2), cardiovascular system arterial and venous infections 2% (n=1), gastroenteritis 2% (n=1) and umbilical catheter-related bloodstream infection 2% (n=1) (Figure 1).

While, according to the old diagnosis criteria in our Premature Clinic, 2014 healthcare-associated infection rate was 21.1%, it was found that the rate was 11.54% according to the new diagnosis criteria and 9.6% decrease was found in the new diagnosis criteria of infection rates. While healthcare-associated infection density according to the old diagnosis criteria in our clinic was 18.3 in 1000 patient-day, it was found that it was 10.01 in 1000 patient-day according to new diagnosis criteria, and 8.31 in 1000 patient-day decrease was detected in the density rate according to the new diagnosis criteria. While our central catheter-related bloodstream infection rate according to the old diagnosis criteria was 9.97 in 1000 catheter-day, it was observed that it rose to 12.46 1000 catheter-day according to the new diagnosis criteria. Although umbilical catheter-related bloodstream infection was detected according to the old diagnosis criteria, it was found that it was 4.29 in 1000 catheter-day according to the new diagnosis criteria.

## Discussion

As a result of the evaluations conducted in our premature clinic, 2014 healthcare-associated infection rate was 21.1% according to the 2010 National Nosocomial Infections Surveillance Guide of Turkey, it was found was

found as 11.54% according to the January 2014 diagnosis criteria of the Centers for Disease Control and Prevention (CDC). When these two guides are compared, the 9.6% difference between the rates of nosocomial infections is noticeable. The most important difference in obtaining difference results between these two guides was that it was thought that clinical sepsis existed in the 2010 National Nosocomial Infections Surveillance Guide of Turkey; however, this diagnosis did not exist in the 2014 CDC diagnosis criteria. Similarly, while healthcare-associated infection density in our clinic was 18.3 in 1000 patient-day according to the 2010 National Nosocomial Infections Surveillance Guide of Turkey, it was found that as 10.01 in 1000 patient-day according to the January 2014 CDC criteria; and similarly, it was put down to the lack of clinical sepsis diagnosis.

It was found that central catheter-related bloodstream infections and umbilical catheter-related bloodstream infections (CCABSI) according to the January 2014 CDC criteria were higher than the 2010 National Nosocomial Infections Surveillance Guide of Turkey (UCABSI). While 9.97 CCABSI was found in 1000 catheter-day, 12.46 UCABSI in 1000 catheter-day was detected according to the 2014 CDC diagnosis criteria. According to the 2009 CDC Intravascular Catheter-Related Bloodstream Infection diagnosis guide (6), while time limits for taking blood culture for the catheter-related bloodstream infection was clearer, the time limit in 2014 CDC diagnosis was longer. According to the 2014 CDC diagnosis, if the patients with the laboratory proven bloodstream infection have >2 central catheter or umbilical catheter, and CCABSI diagnosis is made to the patients with the bloodstream infection proven by the laboratory on the day or a day later when central catheter or umbilical catheter bloodstream infection develop (4). It was found that due to this definition, CCABSI diagnosis and CCABSI rate were higher based on the new criteria.

While no UCABSI was found in any of the patients according to the 2010 National Nosocomial Infections Surveillance Guide of Turkey (5), and 2009 CDC criteria (7), 2.49 UCABSI in 1000 catheter-day was found according to the 2014 CDC criteria. It was thought that due to the pathogenic bacteria growth in a single blood culture according to the new diagnosis criteria and catheter-related diagnosis, an increase was detected. It was required that according to the previous diagnosis criteria, the same microorganism needed to grow at least in one blood culture and at the tip of the catheter or the same microorganism needed to grow in the blood from the catheter and peripheral veins, and three times more bacteria grew in the blood culture taken from the peripheral in comparison to the quantitative blood culture taken from the catheter or growth needed to occur in the blood taken from the cath-

eter >2 hours before (6). According to the 2014 criteria, on the other hand, if the patients with the laboratory proven bloodstream infection had central catheter or umbilical catheter and had central catheter attached for more than two day or the catheter was taken out on the day of diagnosis or a day later, the bloodstream infection proven by the laboratory was related to the central catheter, and growth of pathogen in a single blood culture was necessary in order to make the UCABSI diagnosis (4).

## Conclusion

In conclusion, in the calculations carried out by using the January 2014 CDC criteria, while healthcare-associated infection rate based on the old diagnosis criteria (2009-2010) decreased, it was found that central catheter and umbilical-related bloodstream infection rate increased according to the new criteria. However, before we evaluate the differences that emerged according to the new criteria that the Centers for Disease Control and Prevention (CDC) started to use in the first period, the changes in the old and new criteria must definitely be revised. Furthermore, while the changes (the increase in the infection rate) emerging in the first three months after the new criteria is started to be used may indicate a healthcare-associated problem, it should be remembered that they may, at the same time, be related to the changes between the criteria. Finally, in an attempt to compare the data of healthcare-associated infection data in Turkey in a healthy way with the national and international data, the healthcare-associated surveillance guide "CDC/NHSN Surveillance Definitions for Specific Types of Infections, January 2015 (Modified April 2015) (6)" recently created by the CDC should be re-created in order for all the hospital feeding their data into the Nosocomial Infections Surveillance system (inflow) and for those hospitals to speak the same common language.

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**Informed Consent:** Written informed consent was not received due to the retrospective nature of this study.

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