Available online at www.sciencedirect.com

ScienceDirect

journal homepage: http://www.elsevier.com/locate/medici

Original Research Article

Healthcare-associated infections in Northern Russia: Results of ten point-prevalence surveys in 2006–2010

Ekaterina A. Krieger [a,b], *Andrej M. Grjibovski* [b,c,d,*], *Olga V. Samodova* [a], *Hanne M. Eriksen* [e]

[a] *Department of Infectious Diseases, Northern State Medical University, Arkhangelsk, Russia*
[b] *International School of Public Health, Northern State Medical University, Arkhangelsk, Russia*
[c] *International Kazakh-Turkish University, Turkestan, Kazakhstan*
[d] *Department of International Public Health, Norwegian Institute of Public Health, Oslo, Norway*
[e] *Department of Infectious Diseases Epidemiology, Norwegian Institute of Public Health, Oslo, Norway*

ARTICLE INFO

Article history:
Received 4 December 2014
Received in revised form
1 April 2015
Accepted 7 May 2015
Available online 16 June 2015

Keywords:
Healthcare-associated infections
Pediatric hospital
Russia

ABSTRACT

Background and objective: Statistics on healthcare-associated infections (HAIs) in Russia is scarce and has been considered to suffer from underreporting. We assessed the prevalence and changes in the prevalence of HAIs over 5 years and identified factors associated with acquiring HAIs in the pediatric hospital in Arkhangelsk, Northern Russia.

Materials and methods: Ten cross-sectional studies were conducted in the Arkhangelsk regional pediatric hospital biannually during 2006–2010. We used a standardized protocol, including the criteria of HAI proposed by the Centers for Disease Control and Prevention. Binary logistic regression was applied to study factors associated with HAI.

Results: Altogether, 3264 inpatients were enrolled in the study and 347 of them had HAI (11.2%). The prevalence of HAI per survey ranged from 7.1% (95% CI: 4.8%–10.4%) to 16.7% (95% CI: 13.1%–21.2%). The most prevalent HAIs were upper respiratory tract infections 5.1% (95% CI: 4.4%–5.9%), followed by urinary tract infections, 1.5% (95% CI: 1.2%–2.0%), and acute gastroenteritis, 1.4% (95% CI: 1.1%–1.9%). Compared to infants, children aged 5–9 years (OR = 0.7, 95% CI: 0.4–1.0), 10–14 years (OR = 0.4, 95% CI: 0.3–0.7), and ≥15 years (OR = 0.3, 95% CI: 0.2–0.5) were less likely to have HAI. Neutropenia (OR = 1.5, 95% CI: 1.0–2.3) and use of intravascular catheter(s) (OR = 1.8, 95% CI: 1.1–3.0) were positively associated with HAI.

Conclusions: The observed prevalence of HAIs is within the range reported in several other European countries. We do not recommend generalizing our findings to other Russian

* *Corresponding author at*: Department of International Public Health, Norwegian Institute of Public Health, Post Box 4404 Nydalen, 0403 Oslo, Norway. Tel.: +47 21078319.
E-mail address: andrej.grjibovski@gmail.com (A.M. Grjibovski).

Peer review under the responsibility of the Lithuanian University of Health Sciences.

Production and hosting by Elsevier

http://dx.doi.org/10.1016/j.medici.2015.05.002

settings given considerable variations between regions in both socio-economic situation and conditions of medical facilities.

1. Introduction

Healthcare-associated infections (HAIs) represent a serious public health problem worldwide by increasing hospital mortality [1], duration of hospital stay [2] and cost of treatment [3]. Surveillance of HAI is regarded as an essential tool in infection control [4].

The overall prevalence of HAI ranges from 3.5% to 12.0% in high-income countries and from 5.7% to 19.1% in low- and middle-income countries [5]. In pediatric hospitals, the prevalence of HAIs has been reported to vary between 5.1% and 15.4% [6–10]. The highest prevalence of HAIs is often observed in intensive care units with pneumonia and sepsis being the most frequently reported sites of infection [11–13]. In general pediatric wards, the most prevalent HAI is viral gastroenteritis [10,14]. Age below 1 year, hospital stay for longer than 10 days, and use of urinary or intravascular catheters have been consistently shown to be associated with increased risk of HAI [2,9,14,15].

In Russia, notification of HAI became mandatory by law in 1990. Official documents defined HAI as infections originating in a patient in a hospital as well as occupational infections among hospital staff. The clear definition is not presenting a diagnostic time frame or specific criteria for different categories of HAIs. Each case of HAI has to be reported to the local Center of Federal service on customers' rights protection and human well-being surveillance (Rospotrebnadzor) within 12 h of detecting HAI. Rospotrebnazor is operating at local, regional and national level. Every month the local center reports data to the national Center of Rospotrebnadzor. Federal Statistics Service calculates and reports the incidence of HAIs. The following infections have to be reported: pyoseptical diseases of newborn and puerperant, surgical site infections, injection-acquired infections, urinary tract infections, pneumonia, acute gastrointestinal infections and viral hepatitis B and C [16].

According to Rospotrebnadzor, the incidence of HAIs decreased from 3.2 in 2005 to 0.8 per 1000 patients in 2010 [17,18]. However, according to another official source, the incidence of HAIs in Russia ranges between 1.4 in the Republic of Dagestan to 35.9 per 1000 patients in the Omsk region [19]. Scarce information and conflicting results on the incidence of HAI, in addition to several reports on lack of reliable statistics on HAIs in Russia, under-registration and the overall low quality of epidemiological surveillance [17,19–22], warrant alternative surveillance measures to provide a basis to enhance the practice of infection control in healthcare facilities.

Point-prevalence surveys are known as simple, cost-efficient, and time-saving surveillance options which are recommended by the European Council for HAI surveillance at regular intervals at the national or regional level [23]. The first point-prevalence survey of HAIs in Northern Russia was conducted in the Arkhangelsk regional pediatric hospital in February 2006 and revealed the prevalence of HAIs to be 17%, exceeding the prevalence in most European countries [24]. Since 2006, a surveillance of HAI was introduced in the hospital and 10 point-prevalence surveys have been performed between 2006 and 2010. This study aims to assess the prevalence and changes in the prevalence of HAIs over 5 years and to identify factors associated with acquiring HAIs in Arkhangelsk regional pediatric hospital.

2. Materials and methods

This paper summarizes results of ten point-prevalence surveys conducted in the Arkhangelsk regional pediatric hospital which is the largest pediatric hospital in the Arkhangelsk region. HAI was defined as a localized or systemic infection which was not present on admission or within the first 48 h of hospital stay as recommended by the Centers for Disease Control and Prevention [25]. The 48 h rule was not applied to surgical site infections so all surgical site infections occurring within 30 days after a surgery were included. The list of HAIs, which had to be registered, included all categories of HAIs according to the classification of the CDC [24]. If two HAIs were present in one patient, each infection was registered separately as described elsewhere [24].

We repeated one-day prevalence surveys covering all hospital wards between 2006 and 2010 twice yearly – one in December when respiratory tract infections and viral gastroenteritis are usual and one in April/May when bacterial intestinal infections are more common. All patients staying in the hospital for more than 48 h at 9 a.m. on the day of the survey were included. Demographic information and factors which have been shown in previous studies as significantly associated with HAI were studied [2,8,13,14]. These factors include patient's identification number, date of birth, gender, time of admission, surgery performed within 30 days prior to the day of the survey, neutropenia defined as absolute count of neutrophils <1500 per mm^3, the use of urinary or intravascular (central or peripheral) catheters and site of HAI, if present. Regularly trained infection control team led by a senior clinician collected the data using a standardized registration form. The team reviewed medical records and laboratory data as main sources of information. In disputable situations, attending physician and senior clinicians were consulted. More details about the data collection routines are presented elsewhere [24].

The prevalence of HAIs was calculated as number of infected patients divided by number of observed patients and was reported in percentage. We described the HAIs prevalence