



# Point-prevalence surveillance of healthcare-associated infections in Swedish hospitals, 2008–2014. Description of the method and reliability of results

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## ARTICLE INFO

### Article history:

Received 30 January 2015

Accepted 28 July 2015

Available online 22 August 2015

### Keywords:

Healthcare-associated  
infections  
Prevalence  
Reliability  
Surveillance



## SUMMARY

**Background:** In 2007 the Swedish Association of Local Authorities and Regions (SALAR) decided to establish a nationwide system for point-prevalence surveillance of healthcare-associated infections (HCAIs) among hospitalized patients. Surveillance started in 2008 and has since then been performed twice a year (April and October). The documentation of HCAIs is performed by regular clinical physicians and nurses on each hospital ward aided by oral and written instructions. All Swedish publicly financed hospitals (>95% of all hospitals) are included (25,862 beds in 2008 and 24,905 beds in 2013). A total of 88–92% of all inpatients has been covered in each survey. The overall prevalence of HCAI (including psychiatric inpatients) has ranged from 7.8% to 10.0%.

**Aim:** In 2012 SALAR decided to assess the reliability of the prevalence data.

**Methods:** In all, 1216 patients were assessed for HCAIs by both the regular surveillance teams and teams with expert knowledge on HCAI independently of each other.

**Findings:** The prevalence of HCAI was 8.3% (95% confidence interval: 6.7–9.9) according to the regular teams and 13.1% (11.2–15.0) according to the expert teams. The sensitivity of the regular point-prevalence surveillance was 47% and the specificity 97%.

**Conclusion:** The Swedish system for repeated nationwide point-prevalence surveillance of HCAI has had a high coverage of about 90% since it commenced. However, the surveys underestimate the true prevalence of HCAI.

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## Introduction

Healthcare-associated infections (HCAIs) (formerly hospital-acquired infections) have been recognized and

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considered a problem since at least the middle of the nineteenth century. Florence Nightingale and Joseph Lister both recognized the benefit of knowing rates of HCAI through surveillance. They measured rates of soldiers' deaths in a military hospital and infections after surgery, respectively. They then introduced interventions to reduce the number of infections and subsequently measured the rates again.<sup>1,2</sup> Both are good examples of gathering 'data for action'.

A more recent attempt to measure HCAI rates, and evaluate whether they can be modified by surveillance alone, was the

SENIC (Study on the efficacy of nosocomial infection control) project performed in the USA in the 1970s. This showed that surveillance alone does not lower HCAI rates, and that time and resources are required to analyse the results of surveillance and to implement preventive actions, the impact of which can be measured by further surveillance.<sup>3</sup> During the last two decades numerous initiatives have been taken in many countries to establish methods and systems for prevalence surveys. Llata *et al.* published an overview of national prevalence surveys in 20 countries during 1996–2008.<sup>4</sup>

Swedish healthcare providers have legal obligations to provide care with good hygienic standards, to work continuously to improve patient safety, and to have a management system to systematically and continuously assure the quality of work.<sup>5–7</sup> With knowledge about the overall prevalence of HCAI and rates of different kinds of HCAs in a hospital or clinic, the caregiver should be able to take the right actions in order to fulfil the legal obligations. In 2007 the Swedish Association of Local Authorities and Regions (SALAR) decided to establish a nationwide system for surveillance of HCAI as a part of a broader initiative concerning patient safety. A working group of experienced professionals in infection control from different regions was recruited by SALAR and developed a protocol for repeated point-prevalence registration. The purpose of the surveillance system was to enable caregivers – by using this tool – to obtain data that could be used for local quality improvement.

In 2011 and 2012 the European Centre for Disease Prevention and Control (ECDC) co-ordinated the first European point-prevalence survey of HCAI in acute care hospitals. More than 1000 hospitals in 30 countries including Sweden participated in the survey. From Sweden, however, only four hospitals with a total number of 613 patients participated in the ECDC study.<sup>8</sup> This low uptake was probably a result of the already launched and ongoing national system for point-prevalence surveillance of HCAI in Sweden.

Any survey of HCAI prevalence needs to be assessed for reliability of the data collected. This is because actions taken to prevent HCAs and improve patient safety will need to be evaluated for efficacy with new surveys. Without knowledge about the quality of the data, conclusions regarding the effect of preventive measures based on changes in the prevalence of HCAI between surveys will not be credible. In this paper we describe the methodology for the biannual point-prevalence surveys of HCAI and the process to assess reliability of the method that was performed in 2012.

## Methods

### Definition

The general definition of HCAI was the one widely used in Sweden that was established by the National Board of Health and Welfare in 1979: 'Any infection affecting a patient as a result of hospital care or treatment as an outpatient'. In the surveillance protocol this definition included infections not only resulting from surgical and other invasive procedures, but also infections considered to be related to either ecological effects of antibiotic treatment or immunosuppression due to chemotherapy. The Swedish definition of HCAI is thus based on the association between an infection affecting any organ/site and a treatment of the patient within the healthcare sector.

The diagnosis of the infection is clinical and does not require the presence of specific predefined signs, symptoms, and laboratory findings.

### HCAI categorization

Four categories of HCAI were defined: (1) surgical site infection occurring within 30 days after surgery (within one year after implant surgery); (2) infection related to other kinds of intervention, for example central line bloodstream infection, ventilator-associated pneumonia, and urinary tract infection associated with urinary catheter; (3) infection related to drug treatment, for example *Clostridium difficile* infection related to antibiotic treatment or any infection related to immunosuppressive therapy; (4) any infection occurring later than 48 h after admission and not belonging to category 1, 2, or 3.

### Anatomical categorization

If an HCAI is present the surveillance team is asked to assign it to an organ/site involved, for example upper airway, lower airway, gastrointestinal tract, urinary tract.

### Surveyor instructions

The assessment of the presence or absence of infection is based on signs and symptoms documented in the patient records present at the day of surveillance and/or present earlier during the same inpatient period and/or on hospital admission. In the two latter cases the patient should be on antibiotic treatment. There is no requirement for laboratory results including X-rays, etc., but if such results are available they can be taken into consideration. As the registration is made by a team consisting of a specialist nurse and a physician regularly working in the clinic, their usual and trained clinical judgement of the patient is the basis for determining the presence or absence of infection. If the team has decided that the patient has an infection the next step is to categorize it as community-acquired or healthcare-associated. To be considered an HCAI the infection should belong to one of the four categories described above. A manual for assessment is given for the different categories of HCAI.

### Data collection

Surveillance started in 2008 and has since then been performed twice a year (April and October). All Swedish publicly financed hospitals (>95% of all hospitals) (acute-care, psychiatric, geriatric and rehabilitation, in all about 135 hospitals) are included (25,862 beds in 2008 and 24,905 beds in 2013). Each hospital is free to choose a day for registration within a predefined two-week period. One data collection form is used for each ward in the hospital and every inpatient is included. Gender and age but not identity are noted for each patient and the presence or absence of HCAI is documented as well as the category of HCAI and its anatomical localization.

One or a few appointed persons per hospital collect all questionnaires and enter data into the web-based national database. Access to aggregated data from more than one hospital is only available for a limited number of persons in each county council. Access to data from more than one county

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