Using surveillance data to reduce healthcare–associated infection: a qualitative study in Sweden

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Linköping University Post Print

N.B.: When citing this work, cite the original article.

Original Publication:
http://dx.doi.org/10.1177/1757177415588380
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http://www.uk.sagepub.com/home.nav

Postprint available at: Linköping University Electronic Press
http://urn.kb.se/resolve?urn=urn:nbn:se:liu:diva-120835
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date_count = 4011

Abstract

Introduction: Health care–associated infection (HAI) surveillance data can be used to estimate the scope, spread and location of infections, monitor trends, evaluate preventive efforts, and improve practices, policy and facility planning. In Sweden, national point prevalence surveys (PPS) have been conducted twice yearly in all county councils since 2008.

Aim: The aim of this study was to identify key obstacles concerning the HAI surveillance process.

Methods: Twenty-two infection control practitioners (ICPs) from all county councils in Sweden were interviewed, using semi-structured interview guides. Data were analysed using qualitative content analysis.

Results: Sixteen types of obstacles pertaining to four surveillance stages were identified. Most obstacles were associated with the first two stages, which meant that the latter stages of this process, i.e. the use of the results to reduce HAI, were underdeveloped. The ICPs observed scepticism towards both the PPS methodology itself and the quality of the HAI data collected in the PPS, which hinders HAI surveillance realising its full potential in Swedish health care.

Keywords

Health care–associated infection, surveillance data, prevention
Introduction

Health care–associated infection (HAI) poses a considerable challenge to health care systems worldwide. HAI surveillance data can be used to estimate the scope, spread and location of infections, monitor trends, evaluate preventive efforts, and improve practices, policy and facility planning (CDC, 2001; Llata et al, 2009). Surveillance is defined as the ongoing systematic collection of data regarding health-related events for use in action to reduce morbidity and mortality (Christoffel and Gallagher, 1999).

Surveillance of HAI by means of point prevalence surveys (PPS) has been conducted twice a year in Swedish hospitals since 2008, covering almost all patients in general hospital care and two-thirds of all patients in psychiatric hospital care (SALAR, 2013). PPS provide data about hospitalized patients at one point in time (Emmerson, 1995). The Swedish PPS program is mandated by the Swedish Association of Local Authorities and Regions (SALAR), a member organization for municipalities and county councils with a vision to improve the welfare system and its services.

Several studies (Emmerson et al, 1996; Eriksen et al, 2005; Lizioli et al, 2003; Humphreys et al, 2008; Lyytikäinen et al, 2008; Van der Kooi et al, 2010) have emphasized the importance of HAI surveys for increased awareness of the HAI problem and to generate information to develop appropriate preventive efforts. However, we have not found any studies that have actually investigated how or the extent to which HAI surveillance data have been translated into action, to design, implement and assess efforts for reducing HAI. Therefore, the aim of this study was to identify key obstacles concerning the HAI surveillance process in Sweden.
Methods

Context and design

Swedish health care is publicly funded, i.e. residents are insured by the state, with equal access for the entire population. Health care responsibility is decentralized to 21 county councils, which provide medical care and promote good health for its population (Ministry of Health and Social Affairs, 2011).

Regular clinical staff members (physicians, registered nurses and nurse practitioners) collect the data for the two annual PPS in the wards in hospitals across Sweden. Training for the staff members who gather the data is provided at the different hospitals, but there is no consistent national training scheme for those involved in the PPS. Data collection is carried out in accordance with a national protocol assembled by SALAR, which defines HAI and includes instructions for the PPS data collection procedure (SALAR, 2015).

To respond to the research aim, interviews were conducted with key informants, infection control practitioners (ICPs), assigned to work with HAI surveillance in the county councils. Key informants are persons with first-hand knowledge about the issues and problems investigated (Marshall, 1996). The ICPs were identified through a national network of health professionals with HAI surveillance assignments coordinated by SALAR. Each county council has one or two designated coordinators for HAI surveillance work. One coordinator in each county council suggested an ICP to be invited into the study, who then was contacted by us via email, giving information about the study purpose and attached questions intended for the interview. We also informed that participation was voluntary and confidential,
making it impossible to identify specific county councils' results, and asked for their consent to participate. All persons contacted agreed to participate.

The reason for sending the questions was to allow the interviewee to obtain information on some issues before the interview. We also believed the responses would be more elaborative if the interviewee reflected on the questions in advance.

Questions for the semi-structured interviews were developed by the authors of this study in collaboration with experts from SALAR who are involved in the county councils’ HAI surveillance work. The interviews lasted 30-70 minutes and were conducted by two interviewers between September and November 2012.

Ethical approval was not sought for this study because it did not involve sensitive personal information as specified in the Swedish regulations on ethical approval for research concerning humans (Ministry of Education and Research, 2003).

**Data collection**

Twenty-one telephone interviews were conducted, covering all county councils. One interview was conducted with two people because the HAI surveillance coordinator for this county council suggested that both should take part. Thus, 22 people participated in the interviews.

The first three interviews were considered pilots to improve the questions and were not included in the analysis, but they contributed valuable information on how
the questions were perceived. Some minor changes to the wording of the questions were made after the pilot interviews.

Ten interviews were conducted by the first author and 11 were conducted by a physician recruited by SALAR to investigate various aspects of the county councils’ HAI surveillance work. All the ICPs were asked the same questions. Follow-up questions were used when considered necessary to obtain more detailed answers.

The interviews began with a number of background questions (with set responses): position/title of the person, their estimation of their understanding and overview of the county council’s HAI surveillance work, and how long the person had worked with HAI surveillance in the county council. The interviews focused on perceived obstacles concerning four HAI surveillance stages: (I) HAI data collection, compilation and analysis of results from HAI PPS; (II) dissemination and local interpretation of HAI PPS results; (III) use of HAI PPS results in efforts to reduce HAI; and (IV) assessment of the efforts undertaken on the basis of HAI PPS results. Obstacles could also be general, i.e. not referring to a specific stage. Obstacles were defined as difficulties, problems and challenges concerning the county councils’ use of HAI results in efforts to reduce HAI.

**Data analysis**

The interviews were recorded and transcribed verbatim by a transcription company, and then checked by the first author for accuracy. The data were analysed using qualitative content analysis in accordance with Hsieh and Shannon (2005). Content analysis is a technique for analysis of texts grounded in empirical data with
an explorative and descriptive character, which involves a structured analysis process to code and categorize the data (Hsieh and Shannon, 2005). The analysis process began with the authors reading the transcribed interviews in their entirety to obtain an overall picture and to capture essential features. Meaning units, i.e. words or sentences that are related to each other through content or context, were identified throughout the text. The meaning units were related to the study aim. These units were condensed to contain only a few central words and labelled with suitable codes.

The codes were sorted into categories, i.e. different types of obstacles. The categories were derived inductively from the data. The categories were cross-examined to ensure that they were internally as homogeneous and externally as heterogeneous as possible. The authors discussed the content of the categories using triangulation analysis, i.e. the authors independently analysed the same data and compared their findings. Discussions continued until no inconsistencies existed and a shared understanding was reached in order to prevent researcher bias and strengthen the internal validity (Hsieh and Shannon, 2005).

**Results**

**Respondent characteristics**

Of the ICPs who took part in the 18 interviews that were analysed, four had worked with HAI issues for 1–2 years, 12 for 3–5 years and one for more than 5 years (one person did not answer). The ICPs ranked their knowledge and overview of their county council’s HAI surveillance work as ‘good’ (five persons), ‘very good’ (eight persons) or ‘excellent’ (four persons) (one person declined to answer). Many different professional groups and titles were represented among the ICPs, including chief
physicians, physicians, nurse managers, nurses, infectious disease experts, hygiene experts and patient safety coordinators (more than one profession/position could be given). An equal number of men and women were interviewed.

**Key obstacles concerning the HAI surveillance process**

Five categories emerged from the analysis of the data (Table I). Sixteen obstacles (listed in Table I) were discussed by the ICPs with respect to the county councils’ use of HAI results in preventive efforts.

>>>Table 1 here, if possible<<<

**Technical barriers to work with HAI data and results**

The ICPs pointed to difficulties associated with the identification and registration of HAI occurrences during the two annual days of PPS. ICPs believed the rigidity of the form used to register and enter HAI data could cause inaccuracies. They mentioned that the form did not allow for mistakes or missing details, as data could not be corrected after being entered.

Another obstacle was problems with technical aspects of the HAI database program. There were difficulties in organizing and extracting data from the large HAI data files. ICPs complained about the lack of appropriate computer programs or applications for convenient analysis of the HAI results at different levels of aggregation, such as hospital levels and unit levels (i.e. departments or wards within a hospital).
According to the ICPs, staff at the unit level found it difficult to access the results on the intranet to check or analyse their own results. This process required several steps before the results could be accessed, thus inhibiting local interpretation of HAI results.

**Questionable reliability and applicability of HAI data and results**

The ICPs believed that HAI surveillance provided a reliable regional and national picture of the status of HAI, but many argued that the results were not really applicable at the unit level, where they would potentially be of greatest use.

Several ICPs stated that managers tended to have unrealistic expectations about the feasibility of breaking down the HAI results to the unit level, and that the tools and/or programs for doing so are ill-fitted for that purpose. HAI expressed only as a percentage can be difficult to relate to because this figure may represent less than one patient in a small unit.

Many ICPs believed that there were too few HAI PPS to provide trustworthy results to launch HAI preventive efforts. The HAI PPS is conducted on a single day, which implies a risk of inaccurate results if this survey coincides with an infection outbreak in a hospital.

**Insufficient resources for work with HAI issues**

The ICPs believed limited overall time allocated for HAI work constituted an obstacle. Training for the staff engaged in the data collection was limited and other work related to translating HAI data into action was also characterised ***. This work
competes with other duties, making HAI surveillance only one of many activities that require attention. Many lamented that economic performance and productivity were prioritized over quality aspects of health care.

Another resource limitation was the perceived shortage of staff who actively worked with HAI issues. The ICPs said that HAI work predominantly relied on dedicated champions among the staff and the ICPs. They recognized a risk that this work would slow down if these champions left.

**Lack of interest, competence and understanding regarding HAI issues**

Insufficient competence in HAI surveillance issues was also mentioned as an obstacle. ICPs expressed a great deal of scepticism as to whether staff members from all professions who identify and register HAI occurrences among patients possessed sufficient knowledge regarding HAI to make accurate assessments of the prevalence of HAI.

HAI results were often questioned by staff at the unit level. The ICPs speculated that this could be because the prevalence figures might appear to be quite random at this level. Another possible reason mentioned was the relatively long delay between data collection and availability of the results, which meant that some results were perceived as obsolete when they were finally disseminated to individual units.

Insufficient competence with respect to local interpretation of the HAI results provided a further obstacle. According to the ICPs, staff did not always have the
required skills to interpret the results, which they believed hindered an in-depth understanding of the HAI problem.

The ICPs believed limited involvement in the HAI PPS by physicians constituted an obstacle. Few physicians participated in HAI network meetings organized within the county councils.

A general obstacle for translating HAI results into action was poor unit-level commitment to HAI issues. The ICPs mentioned that it was often difficult to engage unit managers in HAI work. They also stated that the unit staff did not believe they had ownership of the HAI issue. Instead, there was a tendency to export the problem to expert units such as infection control units. The ICPs believed that many county councils took part in SALAR’s two annual HAI PPS without much conviction or enthusiasm, simply because they are mandatory.

The HAI surveillance process was further hindered by limited interest and support from higher management levels in the county councils, as well as the wider organization. The ICPs perceived that HAI issues, including the PPS, were not prioritized by managers at the top levels. Consequently, top management did not always know what was happening concerning HAI in the units. Many staff members dutifully participated in the annual HAI PPS, but they often seemed to lack a clear picture of the usefulness of the results of the surveys.

**Lack of strategies for work with HAI issues**

The lack of strategy to disseminate HAI results in units provided an obstacle to making the staff aware of the unit’s HAI results. ICPs described the dissemination
of HAI results in units as a largely passive diffusion process, with a risk that many staff members did not know much about the results pertaining to their unit.

An obstacle was the absence of an overall strategy at the county council and higher management levels concerning the use of HAI results in efforts to reduce HAI. The ICPs said that work with HAI issues was often disjointed and haphazard.

**Discussion**

We identified 16 types of obstacles, which were attributable to all stages of the HAI surveillance process. Most barriers were associated with the first two stages, which meant that the latter stages of this process, i.e. actually using the results in efforts to reduce HAI, were underdeveloped. Studies of HAI surveillance systems in US hospitals (O’Boyle et al., 2002; Stone et al., 2009) have also noted that ICPs tend to spend the largest proportion of their time collecting and analysing the data, usually devoting less effort to ensuring appropriate use of the results. Surveillance of HAI in Sweden has undoubtedly increased awareness of the HAI problem, but our findings indicate that data and results from the surveys have not been translated into efforts to reduce HAI. As noted by Haley (1995: 7), surveillance ‘does not in itself lead to reductions’.

The ICPs in our study were uncertain about the quality of the data collected in the surveys. They were sceptical about whether all health professionals who register HAIs are sufficiently knowledgeable about these infections to make accurate assessments of the occurrence of HAI. Investigator effects due to subjectivity in the diagnosis of HAIs have been noted in other studies (Gastmeier et al., 1998; Eriksen et al., 2005) and it is widely acknowledged that determining whether patients have an
HAI requires considerable training (Llata et al, 2009). An evaluation of the validity of HAI PPS data in Norway indicated low sensitivity and low positive predictive value of HAI registration by the unit staff compared with HAI ascertainment by the evaluation team, leading the authors to conclude that more training and feedback must be offered to those involved the PPS (Hajdu et al, 2011). Data collected from the PPS conducted in Sweden since 2008 have not been scientifically validated. However, our findings concerning scepticism towards the PPM methodology and the quality of the data suggest that such a validation would be important.

Many ICPs also expressed doubts regarding the methodology of the PPS. These surveys are biased towards collection of data from patients who are in hospital for longer periods, which means that changes in hospital bed availability can affect the rates of HAI (Freeman and Hutchinson, 1980). Results from HAI incidence surveys are generally considered to be of more value than prevalence studies since they are more effective in detecting differences in infection rates, to follow trends, to link infections to risk factors and for inter-hospital and inter-unit comparisons (Emori et al. 1991). However, incidence studies are more time consuming since they require monitoring of all patients within a defined population for a specified time period. Prevalence studies are more cost-effective and can be easily performed as the patient is seen only once (Emmerson, 1995; Humphreys and Smyth, 2006).

Results from the HAI surveys conducted in Sweden since 2008 have not been published in the scientific literature (unlike many other countries). However, various HAI results have been discussed at SALAR meetings and some results are available on the SALAR website. Periodically verifying that HAI surveillance contributes to reduced prevalence of HAI has been described as an important requirement for
successful HAI surveillance systems (Gastmeier et al, 2008). Preliminary results suggest that the prevalence of HAI in Sweden has remained more or less static since the surveys began. The many obstacles identified in this study may provide an explanation for this, but it could also be that awareness of this lack of improvement has contributed to undermining confidence in the survey methodology, thus explaining the limited commitment and support for HAI surveillance at many levels, as described by the ICPs in this study.

Our results show that HAI surveillance work largely depends on committed individuals among the staff and ICPs. Obviously, there are disadvantages in becoming too dependent on individuals because the work may suffer if they tire or take up other job opportunities (Damschroder et al, 2009). The ICPs were clearly aware of such risks, but they did not see any other way than to try to involve more champions and give these more time for work with HAI issues.

The important role of physicians in relation to HAI issues was highlighted by the ICPs. Physicians as a professional group gave credibility to the HAI work, serving as opinion leaders in the terminology of Rogers’ diffusion theory, i.e. individuals working in an organization who are often characterized by having an important position in the social system and an extensive network, exerting influence by being pioneers and role models (Rogers, 2003). The ICPs complained that few physicians participated in HAI-relevant workshops, forums or courses.

There are a number of limitations that should be considered in interpreting the findings of this qualitative study. We sought key informants in accordance with the prerequisites for research using this technique. Thus, the ICPs we interviewed had
roles that exposed them to the information we sought, had access to the desired information and had absorbed the information meaningfully, were willing and able to communicate their knowledge to the interviewer in an intelligible manner and they seemed to be objective and unbiased (Marshall, 1996). All the ICPs believed they had ‘good’, ‘very good’ or ‘excellent’ knowledge and overview of their county council’s HAI surveillance work.

The sample size (18 interviews) was relatively small although all but three county councils were represented by key informants (with interviews pertaining to the remaining three county councils being considered pilots). However, the data analysis confirmed that data saturation was reached after 8–10 interviews, i.e. well before cessation of the interviews. Most of the participants described the same obstacles, suggesting that the study provided a fairly accurate picture of HAI surveillance in the county councils in Sweden. Face-to-face interviews have the advantage of eliciting non-verbal information (Irvine et al, 2013), but telephone interviews were practical and conveniently fitted around the participants’ busy work schedules.

These limits notwithstanding, this study has provided unique information on the obstacles concerning HAI surveillance in Sweden. We have not been able to find any studies in the patient safety literature that have examined factors affecting the ability to translate data and results from HAI prevalence surveys into efforts for reducing HAI.

Conclusions

In conclusion, the results indicate that there are many obstacles to collecting HAI data by means of PPS and using the results in HAI preventive efforts in Swedish
health care. Serving as key informants for the county councils, the ICPs interviewed described many obstacles concerning HAI data collection in PPS, the compilation and analysis of survey results and the dissemination and local interpretation of these results. These obstacles restricted the actual use of HAI results in efforts to reduce HAI. Scepticism towards both the PPS methodology itself and the quality of the HAI data collected in the PPS hinders HAI surveillance realising its full potential in Swedish health care.

**RATS guidelines**

This study adheres to the RATS Guidelines on qualitative research.

**Acknowledgements**

Many thanks to all infection control practitioners who participated. We also wish to thank Einar Sjölund (SALAR) and Ann-Christine Karell for their help. Sincere thanks also to Eva Estling, SALAR.

**Funding**

This work was supported financially by the Swedish Association of Local Authorities and Regions (SALAR).

**Conflict of interests**

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.
References


Humphreys H, Newcombe RG, Enstone J, Emmerson AM, Humphreys H, Fitzpatrick F, Davies E, Newcombe RG, Spencer RC; on behalf of the Hospital Infection Society Steering Group (2008) Four country healthcare associated infection


Table 1. Obstacles to using HAI data and results in efforts to reduce HAI.

<table>
<thead>
<tr>
<th>Category: Type of obstacle</th>
<th>Sub-category: Obstacles</th>
<th>Meaning Unit: Quotations to illustrate the obstacles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical barriers to work with HAI data and results</td>
<td>Identification and registration of occurrence of HAI (I)</td>
<td>‘This protocol is quite rigid. You have to do absolutely everything right, it’s not enough to get 6 out of 7 things right.’ #20</td>
</tr>
<tr>
<td></td>
<td>Technical aspects of the HAI database (I)</td>
<td>‘It would be better if the database was structured so it allowed us to generate complete images that are representative. ... There are no headings, you cannot import [data], cannot process the image; the images are very blunt.’ #6</td>
</tr>
<tr>
<td></td>
<td>Intranet access to HAI results at clinic level (II)</td>
<td>‘There are many clicks [on the webpage] before you get to the results page ... The page with results is difficult to find.’ #3</td>
</tr>
<tr>
<td>Questionable reliability and applicability of HAI data and results</td>
<td>Relevance of HAI results at clinic level (I)</td>
<td>‘It is often two, three infected patients on that day of measurement [of HAI prevalence]. I can imagine that they [clinical staff] think, ‘That’s nothing strange’. But when we add up all the data, they might have a large prevalence.’ #1</td>
</tr>
<tr>
<td></td>
<td>Tools for analysis of HAI results at different levels of aggregation (I)</td>
<td>‘We don’t have good tools today to work with the analysis [of the HAI data and results] at clinical and hospital levels. [We cannot] link it to risk factors. The percentage figures don’t say that much … There are many things we need to follow up on, but we don’t have the tools.’ #10</td>
</tr>
<tr>
<td></td>
<td>Number of HAI PPS (III)</td>
<td>‘You cannot act on a single measurement [of HAI prevalence]. You need a bit more data [before you can act on the results].’ #17</td>
</tr>
<tr>
<td>Insufficient resources for work with HAI issues</td>
<td>Time for HAI surveillance and work (general)</td>
<td>‘The largest barriers are the very tight budgetary constraints; they make it difficult to set aside enough time [for working with HAI issues].’ #4</td>
</tr>
<tr>
<td></td>
<td>Number of staff working with HAI issues (general)</td>
<td>‘I think it is a question of resources, being able to allocate time [to people who can work with HAI issues]. It is the biggest obstacle, the issue of staffing resources.’ #19</td>
</tr>
<tr>
<td>Lack of interest, competence and understanding regarding HAI issues</td>
<td>Competence regarding identification and registration of HAI (I)</td>
<td>‘The people who register [the HAIs] are not always the same; sometimes it can be someone new [who has not registered HAIs previously], … So I haven’t really trusted the results.’ #12</td>
</tr>
<tr>
<td>Questioning of HAI results at clinic level (II)</td>
<td>‘They find it difficult to interpret their own [clinic-level] figures. Are they accurate or not? So they have questioned the numbers quite a bit.’ #3</td>
<td></td>
</tr>
<tr>
<td>Competence regarding local interpretation of HAI results (II)</td>
<td>‘I would like to get an overall picture [of the HAI problem], a better understanding of what a health care associated infection is. I think that we see this as an isolated thing. ‘No but we have no infections’- they say. But if we measure, we will find [infections].’ #6</td>
<td></td>
</tr>
<tr>
<td>Involvement by physicians (I, II)</td>
<td>‘It is harder to reach out to the medical community concerning these issues than it is to [engage] the nursing staff.’ #5</td>
<td></td>
</tr>
<tr>
<td>Commitment to HAI issues at the clinic level (general)</td>
<td>‘I feel that we measure but that we do not utilize the results in the clinics. There are some [clinics] that do. But I wish that all clinics would analyse [their HAI results].’ #1</td>
<td></td>
</tr>
<tr>
<td>Interest and support for HAI issues from higher management levels and the wider organization (general)</td>
<td>‘I have a feeling that the managers at the unit levels and department levels do not request this kind of [HAI] data. It’s more a question of reporting it and ‘that’s fine’.’ #10</td>
<td></td>
</tr>
<tr>
<td>Lack of strategies for work with HAI issues</td>
<td>Strategy for dissemination of HAI results in clinics (II)</td>
<td>‘I can see that they [the HAI results] get stuck with the manager. We do not know if it really is mentioned at the workplace meetings or shared to everyone on the floor.’ #6</td>
</tr>
<tr>
<td>Overall strategy for the use of HAI results (III, IV)</td>
<td>‘We have not had a comprehensive strategy to use the [results from the HAI PPS] measurements. There has to be a strategic decision that enables the [HAI] group to take the lead on this.’ #3</td>
<td></td>
</tr>
</tbody>
</table>

Numbers in parentheses refer to the surveillance stage of the various obstacles: (I) HAI data collection, compilation and analysis of results from HAI PPS; (II) dissemination and local interpretation of HAI PPS results; (III) use of HAI PPS results in efforts to reduce HAI; and (IV) assessment of the efforts undertaken on the basis of HAI PPS results; general, obstacles that were not related to a specific stage of the surveillance process. Numbers after the quotations refer to which interviewee was responsible for the quote.