Surgical Site Infection Surveillance: should you compare me to my neighbour?

Pauline Harrington
SSI Surveillance Manager

23/02/2016
global priority to reduce surgical site infection (SSI)

SSI is one of the biggest threats to delivery of safe surgery

• second most frequent healthcare-associated infection in Europe (17%) and USA (20%)

• SSI leads to extended illness, long-term disability, avoidable death, increased antibiotic consumption, additional cost: €7 billion/year in Europe

• certain proportion of SSIs are preventable
  • extensive evidence base on effective prevention measures
  • quality standards for surgery translate evidence into practical steps
  • surveillance key component of quality standards
Surgical Site Infection Surveillance Service

National surveillance programme was established by Public Health Laboratory Service in 1997 to provide mechanisms and support for hospitals to:

collect and use surveillance data to compare their rates of SSI over time against a benchmark in order to improve patient care by reviewing clinical practice

Participation

- 371 hospitals in England registered (258 NHS, 113 independent sector)
- 17 categories of surgical procedure
- orthopaedics are mandatory, other categories are voluntary
- hospital data not publicly reported apart from orthopaedics
- approx 150 000 records submitted/year – one of the most comprehensive systems in Europe
Definitions and case finding

Case ascertainment
Systematic prospective monitoring of patients for SSI within 30 days of surgery (1 year for implants) through:

- inpatient surveillance
- post discharge surveillance
  - hospital readmission
  - outpatient and community visits *e.g. clinics A&E, community nurse/midwife visits*
  - patient self-reporting via questionnaire

Case definitions
SSI defined according to standard (ECDC/CDC) **clinical** definitions and categorised as:

**Superficial incisional** involves only skin or subcutaneous tissue

**Deep incisional** involves fascial or muscle layers

**Organ/space** any part of anatomy, other than incision, opened/manipulated during surgery
1. Training of surveillance personnel

Hospital staff trained 2013 - 2015

- 633 staff trained
- majority were nurses

Surgical Site Infection Surveillance: Should you compare me to my neighbour?
Quality Assurance cont’d

2. Continuous Support

SSI team provides support on data and clinical queries via telephone and email e.g. OPCS coding queries, inclusion / exclusion criteria, SSI definitions

3. Validation of data

- Electronic and manual expert scrutiny of data for detection of missing, unusual values or non compatibility.
- Surveillance personnel contacted to query data.
- Hospitals can monitor data quality by downloading a user-defined report.
Interpreting a summary report (crude incidence)

- Benchmark comprised of last 5 years of aggregated data
- Includes inpatient and readmission SSI data only
- SSIs detected using other post discharge methods are not included
- Benchmark applies to hospitals completing one quarter or continuous surveillance

**Table 1: No. of operations and completed post-discharge questionnaires with rates of SSI by selected period (Jul-Sep 2015) and the last 4 periods for which data are available (Jul-Sep 2015, Apr-Jun 2015, Jan-Mar 2015, Apr-Jun 2013) at your hospital.**

<table>
<thead>
<tr>
<th>Operations &amp; Surgical Site Infections</th>
<th>Your Hospital</th>
<th>Selected Period</th>
<th>Last 4 Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total no.</td>
<td>75</td>
<td>303</td>
<td></td>
</tr>
<tr>
<td>No. with PQ given</td>
<td>53</td>
<td>183</td>
<td></td>
</tr>
<tr>
<td>% PQ completed</td>
<td>86.6%</td>
<td>87.8%</td>
<td></td>
</tr>
<tr>
<td>Surgical Site Infection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. inpatient/readmission</td>
<td>11</td>
<td>54</td>
<td></td>
</tr>
<tr>
<td>% infected</td>
<td>14.7%</td>
<td>11.2%</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2: Results from all hospitals in this surgical category for the previous 5 years available (Oct-Dec 2010 to Jul-Sep 2015).**

<table>
<thead>
<tr>
<th>Operations &amp; Surgical Site Infections</th>
<th>All Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without PQ</td>
</tr>
<tr>
<td>Operations</td>
<td></td>
</tr>
<tr>
<td>Total no.</td>
<td>11386</td>
</tr>
<tr>
<td>% PQ completed</td>
<td>74.2%</td>
</tr>
<tr>
<td>Surgical Site Infection</td>
<td></td>
</tr>
<tr>
<td>No. inpatient/readmission</td>
<td>1372</td>
</tr>
<tr>
<td>% infected</td>
<td>12.1%</td>
</tr>
<tr>
<td>No. post-discharge confirmed</td>
<td>82</td>
</tr>
<tr>
<td>% infected</td>
<td>0.7%</td>
</tr>
<tr>
<td>All SSI</td>
<td>1454</td>
</tr>
<tr>
<td>% infected</td>
<td>12.3%</td>
</tr>
</tbody>
</table>
Considerations when using surveillance data to make comparisons

Methodology
differences in the following:
– interpretation of case definitions
– inclusion / exclusion criteria
– high and lower risk procedures between studies / countries
– compliance guidelines / care bundles
– length of in-patient stay
– range of PDS methods included in estimates

Other factors
– patient demographics and healthcare systems
– funding, staffing and support

Surveillance is not research – methods used must be sustainable
A national benchmark includes data from all participating hospitals where as research may be based on few sites / centres only
Outlier identification process

- Follow up of cohort, Data collection
  - 1st Jan – 31st March

- Submission and Reconciliation
  - 30th June

- Report available
  - 30th June

- Outlier analysis and identification
  - 14th July

- Outlier alerts

Surgical Site Infection Surveillance: Should you compare me to my neighbour?
Box & whisker plot (Apr 2010 – Mar 2015)

- High = above 90th percentile
- Low = below 10th percentile
- Low participation categories – caution in interpreting
Outlier alert response and support

Response from hospitals

- Acknowledge receipt of outlier notification
- Provide an outline of planned investigation including confirmation of adherence to SSISS methodology

Additional support

- In-depth analysis
- Site visit to hospitals
- Provide contact details of ‘mentor’ hospitals
What else can we do?

• Audit of surveillance:
  – visits to hospital to conduct case note review
    limited number could be done given number of hospitals in England
  – comparison of operation data on HES
    this can be used but not routinely undertaken; partnership with hospitals based on trust

• Work with commissioners so that they have a full understanding of the surveillance process, in particular outlier identification

• Make other methods of post discharge surveillance (PDS) compulsory and use for benchmarking
  hospitals will have to find the resources in a time of financial constraints; SSISS developing an electronic patient questionnaire to ease resource needed in future
Hospital experiences

Royal Brompton and Harefield NHS Foundation Trust

Our trust developed a SSI risk stratification system (BHIS) for CABG patients. This scoring system was predictive of SSI with the area under Receiver Operating Characteristic curve of 0.727. BHIS comprises female gender (2), diabetes (1) or HbA1c >7.5 (3), BMI >30 (2) and LVEF <50% (1), with a gradient in SSI risk as BHIS score increases. Approximately 6% of CABG patients score ≥4, and considered at high risk for SSI. Using BHIS, two surgical teams at Royal Brompton determined an intervention package (BHIS-IP) for high-risk patients, including negative pressure therapy, extended antimicrobial regime, agreed surgical technique including endoscopic vein harvest, BHIS bra for females and a 'photo at discharge' scheme.

Over 18 months, interventional BHIS-IP audit data were collected on 953 patients included in PHE's surveillance CABG module. Of these, the highest score group (≥4) was selected for the study (n=72). No intervention: 6 SSIs, 47 patients (12.6%). Intervention: 6 SSIs, 25 patients (9%).

BHIS is a simple and reproducible predictive score. A multidisciplinary approach to pre-, peri- and post-operative interventions successfully reduces the SSI rate in high-risk CABG patients (0% vs. 13% SSI rate). The project is extended to other surgical teams for our high-risk patients. Our trust's inpatient/readmission SSI incidence falls below the 4% benchmark.

Melissa Rochon, clinical nurse specialist in surveillance

PHE commentary

The experience described by the Royal Brompton and Harefield NHS Foundation Trust emphasises the importance of a multidisciplinary approach to SSI prevention. This trust also implemented an innovative targeted approach to high-risk patients undergoing CABG surgery.

Hornet University Hospital NHS Foundation Trust

In October 2013, the trust was contacted by PHE as the incidence of total knee replacement (TKR) SSIs was above the national 50th percentile. However, on further PHE epidemiological analysis, no direct cause was found and a review of 'underlying processes' was recommended.

As part of the response, a review of surveillance processes was carried out and implemented in April 2014. We introduced active surveillance, where data are collected in real-time, identifying any possible SSI cases early. Case management is done remotely by the orthopaedic team and microbiology consultants. An RCA is performed for every SSI, looking at both individual risk factors and common denominators which could contribute to post-replacement SSIs.

The information from the orthopaedic SSI RACs has helped to focus the 'underlying process' reviews of the surgical patient journey across all surgical specialties, from pre-admission assessment to theatre and ward environment as well as the management and care of surgical wounds, assessing every element of care within the patient journey against evidence-based best practice. The incidence of SSIs in TKR has significantly reduced by this approach and all surgical patients have benefited from the changes we have implemented (eg pre-operative showering check, peri-operative normothermia monitoring, wound care updates).

Aleyna Cikan, microbiology consultant and DIPEC Gemma Martinez-Garcia, infection prevention and control nurse

PHE commentary

At the request of Hornet University Hospital NHS Trust, PHE attended a multi-disciplinary meeting and presented an in-depth epidemiological analysis to identify possible causes for the trust's excess SSI risk in knee prostheses. Our analysis did not identify specific patient and surgical factors that would explain the elevated SSI rate and therefore advised a comprehensive investigation of clinical and surveillance processes.

Salford Royal NHS Foundation Trust

SRFT is committed to carrying out robust SSI surveillance to accurately identify all SSI and subsequently improve practice and patient outcomes. To ensure accurate SSI reporting in accordance with PHE protocols, a multi-disciplinary root cause analysis is undertaken for all suspected SSI.

To improve our understanding of the issues identified, an electronic database was developed to expand upon the data collected and submitted to PHE, which has since allowed us to both monitor practice in accordance with NICE guidelines and identify trends across all surveillance patients, not just those developing a SSI.

Findings from the analysis of this data has led to the undertaking of several projects, all aimed at improving practice and reducing SSI rates within the trust. One such project was the trial of a seven-day telephone service for patients with post discharge surgical wound problems, resulting in a significant overall decrease in hip and knee replacement SSI (p=0.0351). The readmission SSI rate for hips and knees fell from a combined average of 2.6% to 0.8% and patient reported SSI from 5.2% to 2.4% (comparing six months before and after the introduction of the service). Over the same period, wound related A&E attendances fell from 12.1% to 3.6% and wound related readmissions from 4.5% to 1.2%.

Andra Jones, orthopaedic SSI surveillance specialist nurse

Surgical Site Infection Surveillance: Should you compare me to my neighbour?

Multidisciplinary approach and innovative

Auditing against NICE guidelines to reduce rate of infection

Partnership working - outlier alert, PHE visit, in-depth analysis, multidisciplinary approach
summary and conclusion

• A certain amount of SSIs are preventable – surveillance can help save lives
• Benchmarking is effective in identifying real or potential problems provided standard methods are applied to produce comparable, meaningful data
• Outlier alerts are intended as triggers for investigation of any problems related to methodology and clinical care
• Continuous support is available from SSISS to enable hospitals to carry out surveillance effectively.
THANK YOU