Caesarean-Section Surgical Site Infection Surveillance

Annual report
Appendix B
Aneurin Bevan University Health Board
Includes data from 01/01/2016 – 31/12/2016

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Section 1: Results

Surveillance form returns

Table 1.1 Number of inpatient, post-discharge and valid forms returned for the surveillance in 2016 for Aneurin Bevan UHB.

<table>
<thead>
<tr>
<th>No. of inpatient forms returned</th>
<th>No. of expected post-discharge forms</th>
<th>No. of post-discharge forms returned (% forms returned)</th>
<th>No. of valid forms used for data analysis*</th>
<th>% of valid forms used for data analysis*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1416</td>
<td>1416</td>
<td>1416 (100.0)</td>
<td>1400</td>
<td>98.9 (1400/1416)</td>
</tr>
</tbody>
</table>

*Valid forms are forms where the SSI field is completed on the main (inpatient) form, or the infection data is subsequently updated at completion of a post-discharge form. A blank SSI field cannot be assumed to mean there is no infection, so these forms are considered invalid.

\[
\text{% of valid forms} = \frac{\text{Number of valid forms analysed}}{\text{Number of inpatient forms received}} \times 100
\]

Completion rates of surveillance forms

Details on the completion of the SSI field on the inpatient and post-discharge form for all Wales is shown in table 1.2.

The procedure date has not been included as a data item in table 1.2 and 1.3 since all data extractions are based on a record having a procedure date.

Table 1.2 % completion of the SSI field on the C-section surveillance form (inpatient and post-discharge) for Aneurin Bevan UHB.

<table>
<thead>
<tr>
<th>Data Item</th>
<th>No. completed</th>
<th>No. expected</th>
<th>% complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient SSI (Yes/No)</td>
<td>1393</td>
<td>1416</td>
<td>98.4</td>
</tr>
<tr>
<td>If Yes, SSI type</td>
<td>5</td>
<td>8</td>
<td>62.5</td>
</tr>
<tr>
<td>If Yes, Infection date</td>
<td>1</td>
<td>8</td>
<td>12.5</td>
</tr>
<tr>
<td>Post-discharge SSI* (Yes/No)</td>
<td>1400</td>
<td>1393</td>
<td>100.5</td>
</tr>
<tr>
<td>If Yes, Infection date</td>
<td>81</td>
<td>82</td>
<td>98.8</td>
</tr>
<tr>
<td>If Yes, SSI type</td>
<td>74</td>
<td>82</td>
<td>90.2</td>
</tr>
</tbody>
</table>

*Number expected is based on the number of post-discharge forms received.
Surveillance compliance

Table 1.3 shows the compliance of Wales in the mandatory C-section surveillance for 2016. The table includes the number of surveillance forms returned to Public Health Wales for 2016 and the number of valid surveillance forms returned (as detailed in table 1.1). The compliance figure is derived from the number of valid surveillance forms returned to Public Health Wales divided by the number of C-sections performed at the hospital.

**Table 1.3** Coverage of the C-section SSI surveillance compared to procedures reported to PHW in 2016 for Aneurin Bevan UHB.

<table>
<thead>
<tr>
<th>No. of surveillance forms returned to PHW</th>
<th>No. of valid surveillance forms returned to PHW*</th>
<th>No. of C sections reported to PHW</th>
<th>% compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1416</td>
<td>1400</td>
<td>1424</td>
<td>98.3</td>
</tr>
</tbody>
</table>

Figure 1.1 displays the compliance trend for 2008-2016. There was a period of over-compliance from 2010 to 2013, indicating the possibility of coding issues. The denominator for compliance is now provided by the hospital, rather than clinical coding data in PEDW. As a result the data for 2016 reflects a truer value for compliance.

![Compliance Trend Graph](image)

**Figure 1.1** Trend rate for compliance from 2008 to 2016 for Aneurin Bevan UHB.

**Summary:**

98.9% of data received could be used for analysis.

Compliance has increased since 2015, and is currently 98%.
Section 2: SSI rate

SSI rate calculation
Surgical site infection (SSI) rates in this report are calculated as the number of infections (inpatient and post-discharge) divided by the number of valid procedures, and reported as an infection rate per 100 procedures. Since the length of hospital stay after a C-section is generally between two and four days, the majority of SSIs will be captured post-discharge in the community.

Incidence of inpatient, post-discharge and overall SSI
Table 2.1 provides the inpatient and post-discharge SSI rates post C-section surgery. All rates are based on valid forms only.

Table 2.1 Incidence of inpatient and post-discharge SSIs in 2016 for Aneurin Bevan UHB.

|                | No. of procedures analysed | No. of SSI* | SSI rate (%)*  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient</td>
<td>1400</td>
<td>8</td>
<td>0.57 (0.18-0.97)</td>
</tr>
<tr>
<td>Post-discharge</td>
<td>1400</td>
<td>82</td>
<td>5.86 (4.63-7.09)</td>
</tr>
<tr>
<td>Overall**</td>
<td>1400</td>
<td>90</td>
<td>6.43 (5.14-7.71)</td>
</tr>
</tbody>
</table>

*Figures based on valid surveillance forms only. This only includes procedures with either an SSI field completed on the inpatient form or where the infection data is updated post-discharge.

**Overall SSI rate is based on the valid forms rule as described in this document, and is not simply based on addition of the inpatient SSIs to the post-discharge SSIs.

Incidence of SSIs over time
It is important to note that initially not all health boards were participating in the surveillance, and some health boards were participating but with low compliance rates. Data became more reliable from 2010 onwards when all health boards were participating. Table 2.2 provides the overall SSI rate for 2010 – 2016 and broken down by elective and emergency procedures. Figure 2.1 provides the SSI trend over the same time period.
**Figure 2.1** Overall, elective and emergency procedures SSI rates for 2010-2016 for Aneurin Bevan UHB.

**Table 2.2** Overall SSI rate for 2010-2016 for Aneurin Bevan UHB.

<table>
<thead>
<tr>
<th>Operation Type</th>
<th>Year</th>
<th>No. Procedures</th>
<th>No. SSI</th>
<th>%SSI (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All C-section procedures</td>
<td>2016</td>
<td>1400</td>
<td>90</td>
<td>6.43 (5.14-7.71)</td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td>1400</td>
<td>43</td>
<td>3.07 (2.17-3.98)</td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td>1614</td>
<td>36</td>
<td>2.23 (1.51-2.95)</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>1728</td>
<td>37</td>
<td>2.14 (1.46-2.82)</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>1547</td>
<td>41</td>
<td>2.65 (1.85-3.45)</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td>1573</td>
<td>39</td>
<td>2.48 (1.71-3.25)</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>1592</td>
<td>112</td>
<td>7.04 (5.78-8.29)</td>
</tr>
<tr>
<td>Elective</td>
<td>2016</td>
<td>626</td>
<td>33</td>
<td>5.27 (3.52-7.02)</td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td>581</td>
<td>16</td>
<td>2.75 (1.42-4.08)</td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td>634</td>
<td>14</td>
<td>2.21 (1.06-3.35)</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>647</td>
<td>13</td>
<td>2.01 (0.93-3.09)</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>528</td>
<td>21</td>
<td>3.98 (2.31-5.64)</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td>593</td>
<td>17</td>
<td>2.87 (1.52-4.21)</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>588</td>
<td>40</td>
<td>6.8 (4.77-8.84)</td>
</tr>
<tr>
<td>Emergency</td>
<td>2016</td>
<td>774</td>
<td>57</td>
<td>7.36 (5.52-9.20)</td>
</tr>
<tr>
<td></td>
<td>2015</td>
<td>799</td>
<td>25</td>
<td>3.13 (1.92-4.34)</td>
</tr>
<tr>
<td></td>
<td>2014</td>
<td>976</td>
<td>22</td>
<td>2.25 (1.32-3.19)</td>
</tr>
<tr>
<td></td>
<td>2013</td>
<td>1057</td>
<td>24</td>
<td>2.27 (1.37-3.17)</td>
</tr>
<tr>
<td></td>
<td>2012</td>
<td>1002</td>
<td>20</td>
<td>2.00 (1.13-2.86)</td>
</tr>
<tr>
<td></td>
<td>2011</td>
<td>957</td>
<td>21</td>
<td>2.19 (1.27-3.12)</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>961</td>
<td>71</td>
<td>7.39 (5.73-9.04)</td>
</tr>
</tbody>
</table>
### Incidence of SSI by infection type

The type of SSI recorded on the surveillance form can be categorised into either superficial, deep seated or organ/space infections, which all have specific definitions. Table 2.3 breaks down the infections by type of SSI. Tables 2.4 and 2.5 show the overall infection rate and the post-discharge infection rate broken down by SSI type.

#### Table 2.3 Types of SSI for C-section procedures carried out in 2016 for Aneurin Bevan UHB.

<table>
<thead>
<tr>
<th>SSI type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial infections</td>
<td>92.22</td>
</tr>
<tr>
<td>Deep seated infections</td>
<td>4.44</td>
</tr>
<tr>
<td>Organ/space infections</td>
<td>1.11</td>
</tr>
<tr>
<td>Unknown</td>
<td>2.22</td>
</tr>
</tbody>
</table>

#### Table 2.4 Overall SSI rate (%) broken down by SSI type in 2016 for Aneurin Bevan UHB.

<table>
<thead>
<tr>
<th>SSI type</th>
<th>No. SSI</th>
<th>% SSI (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial infections</td>
<td>83</td>
<td>5.93 (4.69-7.17)</td>
</tr>
<tr>
<td>Deep seated infections</td>
<td>4</td>
<td>0.29 (0.01-0.57)</td>
</tr>
<tr>
<td>Organ/Space infections</td>
<td>1</td>
<td>0.07 (0.00-0.26)</td>
</tr>
<tr>
<td>Unknown</td>
<td>2</td>
<td>0.14 (0.00-0.34)</td>
</tr>
</tbody>
</table>

#### Table 2.5 Post-discharge SSI rate (%) broken down by SSI type in 2016 for Aneurin Bevan UHB.

<table>
<thead>
<tr>
<th>SSI type</th>
<th>No. SSI</th>
<th>% SSI (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial infections</td>
<td>77</td>
<td>5.50 (4.31-6.69)</td>
</tr>
<tr>
<td>Deep seated infections</td>
<td>3</td>
<td>0.21 (0.00-0.46)</td>
</tr>
<tr>
<td>Organ/Space infections</td>
<td>1</td>
<td>0.07 (0.00-0.26)</td>
</tr>
<tr>
<td>Unknown</td>
<td>1</td>
<td>0.07 (0.00-0.26)</td>
</tr>
</tbody>
</table>

### Summary:

The SSI rate following C-section procedures in 2016 was 6.43% compared to 3.07% and 2.23% in 2015 and 2014, respectively.

Most common infection type is superficial (92.2% of infections).

Overall SSI rate, broken down by SSI type: 5.93% superficial, 0.29% deep seated, and 0.07% organ/space infections.

The overall SSI rate, the elective SSI rate and the emergency SSI rate have all increased from 2015. The increase in overall SSI rate and the emergency SSI rate is statistically significant (p<0.005)
Section 3: General demographics

This section gives information about the age groups and BMI of patients and the number of SSIs associated with each category.

Figure 3.1 provides a pyramid plot showing the age and SSI rates and table 3.1 provides the number of SSI by the specified age groups. Table 3.2 displays the number of SSIs by BMI category.

Incidence of SSI by age

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of valid procedures</th>
<th>No. of SSI</th>
<th>% SSI (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>38</td>
<td>2</td>
<td>5.26 (0.00-12.36)</td>
</tr>
<tr>
<td>20-24</td>
<td>211</td>
<td>15</td>
<td>7.11 (3.64-10.58)</td>
</tr>
<tr>
<td>30-34</td>
<td>398</td>
<td>25</td>
<td>6.28 (3.90-8.67)</td>
</tr>
<tr>
<td>35-39</td>
<td>257</td>
<td>13</td>
<td>5.06 (2.38-7.74)</td>
</tr>
<tr>
<td>≥40</td>
<td>70</td>
<td>4</td>
<td>5.71 (0.28-11.15)</td>
</tr>
</tbody>
</table>

Figure 3.1 Pyramid plot showing age and corresponding SSI rate (%) for Aneurin Bevan UHB.

Table 3.1 C-section SSI by age in 2016. Procedures where age information was not provided were excluded for Aneurin Bevan UHB.
Incidence of SSI by BMI

Table 3.2 C-section SSI rates by BMI in 2016 for Aneurin Bevan UHB. Procedures where BMI information was not provided were excluded.

<table>
<thead>
<tr>
<th>BMI category</th>
<th>No. of procedures</th>
<th>No. of SSI</th>
<th>% SSI (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.5</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Healthy weight</td>
<td>18.5-24.9</td>
<td>369</td>
<td>19</td>
</tr>
<tr>
<td>Overweight</td>
<td>25.0-29.9</td>
<td>304</td>
<td>25</td>
</tr>
<tr>
<td>Obese</td>
<td>≥30.0</td>
<td>321</td>
<td>28</td>
</tr>
</tbody>
</table>

Summary:
There appears to be no overall trend for SSI rates when comparing between age groups.

There is a general increase in SSI rates as the weight of the patient increases.
Section 4: Details of the surgical procedure
The following section provides SSI rates associated with specific variables, including the type of operation (elective or emergency), use of and timing of antibiotic prophylaxis and skin closure types.

Incidence of SSI following elective and emergency procedures

**Table 4.1** C-section SSI in elective and emergency surgical procedures in 2016 for Aneurin Bevan UHB. Procedures where this information was not provided were excluded.

<table>
<thead>
<tr>
<th>Operation type</th>
<th>No. of procedures</th>
<th>No. of SSI</th>
<th>% SSI (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective procedure</td>
<td>626</td>
<td>33</td>
<td>5.27 (3.52-7.02)</td>
</tr>
<tr>
<td>Emergency procedure</td>
<td>774</td>
<td>57</td>
<td>7.36 (5.52-9.20)</td>
</tr>
</tbody>
</table>

Incidence of SSI by timing of antibiotic prophylaxis

**Table 4.2.1** Percentage (%) of C-section procedures by timing of antibiotic prophylaxis in 2016 for Aneurin Bevan UHB. Procedures where no antibiotics given were excluded.

<table>
<thead>
<tr>
<th>Timing of antibiotic prophylaxis</th>
<th>No. of procedures</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to incision</td>
<td>1319</td>
<td>94.76</td>
</tr>
<tr>
<td>After incision</td>
<td>73</td>
<td>5.24</td>
</tr>
</tbody>
</table>

**Table 4.2.2** C-section SSI by antibiotic prophylaxis in 2016 for Aneurin Bevan UHB. Procedures where no antibiotic information given were excluded.

<table>
<thead>
<tr>
<th>Was prophylactic antibiotic given?</th>
<th>No. of procedures</th>
<th>No. of SSI</th>
<th>% SSI (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, prior to incision</td>
<td>1319</td>
<td>86</td>
<td>6.52 (5.19-7.85)</td>
</tr>
<tr>
<td>Yes, after incision</td>
<td>73</td>
<td>4</td>
<td>5.48 (0.26-10.7)</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
<td>0.00 (0.00-0.00)</td>
</tr>
</tbody>
</table>
Incidence of SSI by wound closure type

Table 4.3 Percentage (%) of C-section procedures by type of skin closure in 2016 for Aneurin Bevan UHB. Procedures where this information was not available were excluded.

<table>
<thead>
<tr>
<th>Type of wound closure</th>
<th>No. of procedures</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolvable suture</td>
<td>1310</td>
<td>94.1</td>
</tr>
<tr>
<td>Removable suture</td>
<td>78</td>
<td>5.6</td>
</tr>
<tr>
<td>Staples</td>
<td>4</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Table 4.4 C-section SSI rates by type of skin closure in 2016 for Aneurin Bevan UHB. Procedures where closure type information is missing were excluded.

<table>
<thead>
<tr>
<th>Type of wound closure</th>
<th>No. Of procedures</th>
<th>No. Of SSI</th>
<th>% SSI (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolvable suture</td>
<td>1310</td>
<td>81</td>
<td>6.18 (4.88-7.49)</td>
</tr>
<tr>
<td>Removable suture</td>
<td>78</td>
<td>8</td>
<td>10.26 (3.52-16.99)</td>
</tr>
<tr>
<td>Staples</td>
<td>4</td>
<td>1</td>
<td>25.00 (0.00-67.44)</td>
</tr>
</tbody>
</table>

Summary:
Antibiotic prophylaxis was given to 100.0% of patients.

94.76% of patients received their antibiotic prophylaxis prior to incision, with the remainder receiving antibiotics after incision.

99.7% of wounds were closed with sutures, with the remaining few using staples. Most sutures used were of the dissolvable variety.