Title: In-depth review of the Pre 48 hr MRSA cases occurring between April 2013 and August 2014
Agenda Item: 7

1. Purpose of the paper

The attached paper and action plan provides the committee with the findings from the commissioned review of the pre 48hr MRSA cases assigned to Bristol CCG during 2013-14 and the first few cases reported in 2014-15 and the proposed actions.

The report on the commissioned review was originally presented to the committee in October, but this was not debated as it was noted that not all MRSA cases had been included. The report has since been refreshed and includes all pre 48hr MRSA cases up to August 2014.

2. Background

As from the 1st April 2013 all reported MRSA blood stream infection cases are assigned to either an acute Trust or a CCG depending on when the infection was identified. An investigation is undertaken, Post Infection Review (PIR), with the purpose of identifying how a case of MRSA bloodstream infection occurred and to identify actions that will prevent it reoccurring.

Bristol CCG reviewed its first 10 cases at the beginning of 2014, which identified a possible link with Intravenous Drug Users (IVDU). At the end of 2013-14 Bristol was seen as an outlier in terms of the number of cases therefore a separate review was commissioned, undertaken by a Public Health Consultant in the Local Authority.

3. Key Points

The report reviewed the cases and grouped these under four board headings based on patient characteristics and clinical history:

1. Community Acquired MRSA linked with children
2. Intravenous Drug Users
3. Complex case
4. Diabetic patients

A comparison with the eight core cities was also undertaken which showed a similarity with the number of cases reported in Liverpool. The city of Leeds had previously had a high incidence but is now reporting much lower numbers; therefore the report recommends further investigation of these two cities and specifically the actions taken by Leeds to reduce their rate.

From the analysis the following recommendations have then been drawn to support further exploration of these areas.
1. Review foot care in diabetic patients. The scope of this review should include data on amputations, admission to hospital and a review of current patient education and podiatry services. There may be some merit in expanding the review to include the health needs and management of diabetes.

2. Review infection control within the care home settings.

3. Set up a task and finish group to pilot intervention and education project with intravenous drug users. This should include Public Health England, Drugs Project, Public Health and CCG.

4. Review the non IVD cases with previous colonalisation to obtain more detailed information on the original infection of MRSA.

5. Explore and investigate the trends on MRSA in Liverpool and Leeds. Identify any areas for good practice in Leeds.

6. Review the structure of the PIR form and make recommendations

7. Review the 3 cases in children to obtain more detailed information on the original source of MRSA

4. **Financial Implications**

   There are financial implications for the CCG for not achieving the zero target set for MRSA blood stream infections.

5. **Risk Assessment**

   The risks associated with the high incidence of pre 48 hr MRSA blood stream infections relate to patient safety risks and CCG performance measures.

6. **Implications on equality and health inequalities**

   There are no specific health inequalities issues raised in the paper

7. **Legal / regulatory Issues**

   There are no legal or regulatory implications associated with the paper

8. **Recommendations**

   The Governing Body is asked to note the findings in the report and agree the recommendations and associated actions to support a reduction in the number of pre 48hr MRSA bloodstream infections.

Bridget James  
Head of Quality  
Bristol CCG

Alison Moon  
Director of Transformation and Quality  
Bristol CCG  
5th December 2014
In-depth review of the Pre 48 hours MRSA cases occurring between April 2013 and July 2014

Author: Leonie Roberts, Public Health Consultant, Bristol City Council

October 2014

Purpose
The aim of the review is to determine if Bristol CCG is an outlier in terms of the numbers of reported pre 48hr MRSA cases compared to other CCG.

Identify any themes and actions that can be implemented to reduce the incidence of pre 48 MRSA cases assigned to Bristol CCG

Background
What is MRSA?

Staphylococcus aureus is a common type of bacteria that is often carried on the skin or in the body with no signs or symptoms of an infection. It can cause disease if there is an opportunity for it to enter the body through broken skin or a procedure requiring the use of an invasive medical device.

Most strains of S. aureus are sensitive to the more commonly used antibiotics, and infections caused by them can be effectively treated. However, some have developed resistance to these antibiotics and often require different types of antibiotics to treat them. MRSA is a type of S. aureus bacteria that is resistant to antibiotics known as beta-lactams. This group of antibiotics include methicillin and other more common antibiotics such as oxacillin, penicillin and amoxicillin.

About 30% of the UK population are colonized with Staphylococcus aureus, and a small proportion of these (1–3% of the total population) are colonized with MRSA.

MRSA Infections

Staphylococcus aureus is a bacterium (micro-organism), which about a third of the population carry on their skin or in their nose without it causing them any harm. The organism can sometimes cause skin infections such as boils and abscesses; many such infections are not serious and are easily treated, but in certain vulnerable individuals more serious infections can occur.
MRSA infection occurs if the organism invades the skin or deeper tissues and multiplies to cause an immune response i.e. a local or systemic reaction causing pain, redness swelling cellulites, pus, pyrexia etc. Infections can range from minor skin lesions to deep abscess, chest infections, pneumonia, and urinary tract infections. MRSA infection should be suspected if wound exudate increases, or if healing is slow and for any infection that is not responding to antibiotics.

**MRSA bacteraemia**

An MRSA bacteraemia is an infection of the circulating bloodstream. This can become a life threatening sepsis that can lead to death if not diagnosed early and treated effectively.

**Healthcare associated MRSA**

In the UK, most of the methicillin-resistant *Staphylococcus aureus* (MRSA) infections appear to have a primary care onset and occur in people who have had direct or indirect contact with hospitals, care homes, and other healthcare facilities. These strains of healthcare-associated MRSA (HA-MRSA) may be carried asymptomatically for months after discharge.

**Community-acquired MRSA infection**

Community-acquired MRSA infection (C-MRSA) first emerged twenty years ago and is an increasing problem within the UK. There are specific risk groups in the community, such as the homeless, those who play contact sports and injecting drug users. In the UK, the term community-acquired MRSA may refer to infections in residential homes caused by hospital strains of MRSA. However, some other countries (e.g. United States) are describing strains of MRSA that have arisen in the community (‘true' community MRSA) and are very different from hospital MRSA strains. Some of these strains carry a toxin called Panton-Valentine Leukocidin (PVL). There is international concern about the emergence of community acquired MRSA (C-MRSA). ‘True’ community MRSA infection occurs in a previously healthy individual who has no recognised risk factors associated with MRSA - for example, no previous hospitalisation, surgical procedures or prolonged antibiotic treatment. Although C-MRSA has become an important problem in some parts of the US, the size of the problem in the UK is unknown and the epidemiology is poorly described. The MRC has funded University College London to investigate this issue.¹

¹ University College London The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset  http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163
Post infection Review Process (PIR)

As from the 1\textsuperscript{st} April 2013 all NHS organisations reporting cases of MRSA via the Healthcare Associated Infections Data capture system have been required to complete a Post Infection Review (PIR). All cases reported are assigned to either an acute Trust or a CCG through the completion of a Post Infection Review.

The principal purpose of the Post Infection Review (PIR) guidance is to support commissioners and providers of care to deliver zero tolerance on MRSA bloodstream infections, as set out in the Planning Guidance \textit{Everyone counts: Planning for Patients 2013/14}. The purpose of the PIR is to identify how a case of MRSA bloodstream infection occurred and to identify actions that will prevent it reoccurring.

Findings from the Bristol CCG PIR investigations April 2013 to August 2014

Between April 2013 and August 2014 there have been 21 cases of MRSA assigned to Bristol CCG.

To summarise these cases, they could be grouped into four categories based on patient characteristics and clinical history:

1. Community Acquired MRSA
   Three patients were children. One child was from Pakistan, the second child’s mother had previous history of MRSA and the third child’s parents spoke very limited English. The MRSA infections appear to be in children who were previously healthy. It may be worth exploring the hypothesis that these children are ‘True’ community MRSA cases.

2. Intravenous Drug Users
   Nine patients (40\%) were intravenous drug users. They are a known at risk group, but this appears to be a particular problem within Bristol.

3. Complex case
   Nine patients were complex cases with previous history of MRSA colonization and/or hospital admissions. It is not known where all of these patients originally acquired MRSA. It is likely that these patients have acquired MRSA from previous healthcare contact.
4. Diabetic patients
Three cases of MRSA were found in diabetic patients with foot ulcers. One of these lived in a care home and the other two lived at home. Two of these patients died. This raises two potential areas for further investigations. Firstly the management of diabetes, in particular diabetic foot care. Secondly, the care and treatment of MRSA within care home settings.
## MRSA cases

<table>
<thead>
<tr>
<th></th>
<th>Organisation</th>
<th>Location</th>
<th>Ward</th>
<th>Nature</th>
<th>Date</th>
<th>Comments</th>
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</thead>
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<tr>
<td>1</td>
<td>305195</td>
<td>Nottingham</td>
<td>PICU</td>
<td>PICU Multiple organ failure, MRSA</td>
<td>1\textsuperscript{st} August 2013</td>
<td>Transfer from other hospital</td>
</tr>
<tr>
<td>2</td>
<td>294645</td>
<td>North Bristol Trust</td>
<td>A and E Ward 202 Theatre</td>
<td>A and E Ward 202 Theatre Pus on his wound and flu like symptoms</td>
<td>27\textsuperscript{th} May 2013</td>
<td>Unknown – no evidence of health care failings.</td>
</tr>
<tr>
<td>3</td>
<td>305217</td>
<td>University Hospital Bristol NHS Foundation Trust</td>
<td>A and E Ward 17 medical admissions</td>
<td>A and E Ward 17 medical admissions Ward 15 Septic arthritis and exacerbation of psoriasis</td>
<td>31\textsuperscript{st} July 2013</td>
<td>IVDU with no fixed abode Previous history of MRSA</td>
</tr>
<tr>
<td>4</td>
<td>306388</td>
<td>Bristol CCG</td>
<td>University Hospital Bristol NHS Foundation Trust</td>
<td>Emergency department Ward 17 MRSA Admitted from Brunel Care Home Ulcerated left foot</td>
<td>7\textsuperscript{th} August 2013</td>
<td>Screened for MRSA on admission Infection control in care home Patient died</td>
</tr>
<tr>
<td>5</td>
<td>312672</td>
<td>Bristol CCG</td>
<td>University hospital Bristol NHS foundation trust</td>
<td>Emergency department, royal hospital for children MRSA screened on admission</td>
<td>12\textsuperscript{th} September 2013</td>
<td>At home</td>
</tr>
</tbody>
</table>

\(1\) University College London The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset [http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163](http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163)
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<th>Note</th>
<th>Date</th>
<th>Action</th>
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<tr>
<td>6</td>
<td>307926</td>
<td>Bristol CCG</td>
<td>Bristol Royal Infirmary Hospital</td>
<td>A and E Ward 15</td>
<td>Abscess to groin</td>
<td>17/8/2013</td>
<td>IVDU Left Prison in 2013</td>
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<tr>
<td>7</td>
<td>313988</td>
<td>Bristol CCG</td>
<td>Imperial college NHS trust,</td>
<td>Emergency department</td>
<td>Sickle cell patient Known MRSA patient</td>
<td>22 September 2013</td>
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<td>8</td>
<td>316511</td>
<td>Bristol CCG</td>
<td>University hospital CCG</td>
<td>Emergency department</td>
<td>Swollen left leg Self-injecting Heroin</td>
<td>6th October 2013</td>
<td>IVDU with no fixed abode Previous history of mrsa</td>
</tr>
<tr>
<td>9</td>
<td>326241</td>
<td>Bristol CCG</td>
<td>University hospital Bristol</td>
<td>Medical assessment Unit</td>
<td>Swollen right leg Groin abscess Referred by GP</td>
<td>5th May 2013</td>
<td>IVDU</td>
</tr>
<tr>
<td>10</td>
<td>316294</td>
<td>Bristol CCG</td>
<td>University Hospital Bristol</td>
<td>Medical Assessment Unit</td>
<td>Patient presented following a fall Type 2 diabetic Foot ulcer Previously colonized MRSA</td>
<td>6th October 2013</td>
<td>Podiatry team were unaware the patient was MRSA</td>
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<tr>
<td>11</td>
<td>363142</td>
<td>Bristol CCG</td>
<td>UHB</td>
<td>Emergency</td>
<td>MRSA</td>
<td>22nd July</td>
<td>IVDU</td>
</tr>
</tbody>
</table>

1. University College London The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset. [http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163](http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163)
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<th>Patient ID</th>
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<th>Department</th>
<th>IVDU</th>
<th>Date</th>
<th>Notes</th>
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<td>Bristol CCG</td>
<td>UHB</td>
<td>Emergency Department Ward 17</td>
<td>IVDU</td>
<td>22nd July 2014</td>
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<td>Northwick Park, Harrow</td>
<td>Emergency Department Ward 11</td>
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<td>2nd August 2014</td>
<td>Newly diagnosed osteomyelitis with ankle and knee lesions.</td>
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<td>342512</td>
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<td>UHB</td>
<td>A&amp;E</td>
<td></td>
<td>16th March 2014</td>
<td>Joint pain, facial rash and temperature. Previous MRSA, colonised.</td>
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<td>344413</td>
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<td>UHB</td>
<td>A&amp;E</td>
<td></td>
<td>31st March 2014</td>
<td>Attended A&amp;E history of being unwell. Previous MRSA, colonised.</td>
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<tr>
<td>344983</td>
<td>Bristol CCG</td>
<td>UHB</td>
<td>A&amp;E</td>
<td></td>
<td>2nd April 2014</td>
<td>Referred by GP PT had history of chest pain and Pyrexia. Previous MRSA, colonised.</td>
</tr>
</tbody>
</table>

1 University College London. The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset. [http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163](http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163)
<table>
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<th>Case No.</th>
<th>MRSA Colonisation No.</th>
<th>Location</th>
<th>Source</th>
<th>Diagnostics</th>
<th>Date</th>
<th>Clinical Details</th>
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<td>18</td>
<td>347994</td>
<td>Bristol CCG</td>
<td>NBT</td>
<td>A&amp;E</td>
<td>History of Diarrhea</td>
<td>18th April 2014</td>
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<td>19</td>
<td>357611</td>
<td>Bristol CCG</td>
<td>UHB</td>
<td>SAU</td>
<td>Referred by GP septic, swollen right ankle, cellulitis, open toe wound. Diabetic and asthmatic</td>
<td>20th June 2014</td>
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<td>20</td>
<td>358122</td>
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<td>UHB</td>
<td>A&amp;E</td>
<td>Swollen right leg and groin abscess</td>
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<tr>
<td>21</td>
<td>358513</td>
<td>Bristol CCG</td>
<td>UHB</td>
<td>A&amp;E</td>
<td>Unwell with thrombosis in left arm and cellulitis</td>
<td>25th June 2014</td>
</tr>
</tbody>
</table>

1. University College London The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset [http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163](http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163)
Analysis of CCG assigned MRSA in Bristol from 2009 to 2014

DATA WARNING
It is not appropriate to draw conclusions by comparing CCGs against each other. Fluctuations in the data can occur for a number of reasons and high fluctuations may not necessarily indicate an outbreak - for instance, organisational changes, variations in the patient populations being treated and seasonality can also cause large variation. Data has been used in this report purely to give an example of trends in MRSA over the last 5 years and develop hypothesis to be explored further.

Definition
A trust assigned case is where a completed PIR considers the Trust to be the best place to ensure that any lessons learnt are actioned.
A CCG assigned case is where a completed PIR considers the CCG to be the best place to ensure that any lessons learnt are actioned. The number of cases assigned to the Trust may be different from the previous arrangements.

Bristol and Liverpool have consistently had the highest rate of CCG assigned MRSA. Leeds saw a dramatic drop in the numbers of cases in 2012. During this time period there was some intensive work in Leeds, following high levels of MRSA within the healthcare setting in 2010/11.

Number of cases and rate per 100,000 assigned to the core cities CCG

<table>
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<tr>
<th>CCG</th>
<th>2009/10 No</th>
<th>2009/10 rate</th>
<th>2010/11 No</th>
<th>2010/11 rate</th>
<th>2011/12 No</th>
<th>2011/12 rate</th>
<th>2012/13 No</th>
<th>2012/13 rate</th>
<th>2013/14 No</th>
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<td>21</td>
<td>5.0</td>
<td>9</td>
<td>2.1</td>
<td>12</td>
<td>2.8</td>
<td>18</td>
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<td>14</td>
<td>3.2</td>
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<td>Liverpool</td>
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<td>5.2</td>
<td>17</td>
<td>3.7</td>
<td>9</td>
<td>1.9</td>
<td>16</td>
<td>3.4</td>
<td>17</td>
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<tr>
<td>Birmingham Cross City</td>
<td>22</td>
<td>3.1</td>
<td>20</td>
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<td>22</td>
<td>3.1</td>
<td>15</td>
<td>2.1</td>
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<tr>
<td>Nottingham City</td>
<td>11</td>
<td>3.7</td>
<td>9</td>
<td>3.0</td>
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<td>Central Manchester</td>
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<td>7</td>
<td>4.0</td>
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<td>1.7</td>
<td>5</td>
<td>2.7</td>
<td>3</td>
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<tr>
<td>Newcastle North and East</td>
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<td>2.9</td>
<td>3</td>
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<td>2.2</td>
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<td>0</td>
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<td>2</td>
<td>5</td>
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<td>6</td>
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<tr>
<td>Leeds South</td>
<td>22</td>
<td>9.6</td>
<td>15</td>
<td>6.4</td>
<td>13</td>
<td>5.5</td>
<td>5</td>
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<td>4</td>
<td>1.7</td>
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<tr>
<td>Leeds North</td>
<td>13</td>
<td>6.5</td>
<td>14</td>
<td>7.0</td>
<td>4</td>
<td>2.0</td>
<td>4</td>
<td>2.0</td>
<td>4</td>
<td>2.0</td>
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**Top scoring CCG**

In the last two years, Bristol’s rate of CCG assigned MRSA has been in the top twenty. Bristol ranked 52, 134 and 53 for 2011/12, 2010/11 and 2009/10 respectively. It

<table>
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<tr>
<th></th>
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<th>2011/12</th>
<th>2010/11</th>
<th>2009/10</th>
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<tr>
<td>West London (K&amp;C &amp; Qpp)</td>
<td>5.9</td>
<td>St Helens</td>
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<td>Bassetlaw</td>
<td>6.2</td>
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<tr>
<td>North &amp; West Reading</td>
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<td>Hounslow</td>
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<td>Hillingdon</td>
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<td>Vale Royal</td>
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<td>North &amp; West Reading</td>
<td>5.0</td>
<td>Dartford, Gravesham And Swanley</td>
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<tr>
<td>Enfield</td>
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<td>Halton</td>
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<td>Leeds West</td>
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<td>Sunderland</td>
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<td>Tower Hamlets</td>
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<td>Tameside And Glossop</td>
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<td>Blackburn With Darwen</td>
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<td>Eastern Cheshire</td>
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<td>Ealing</td>
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<td>North Kirklees</td>
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<td>Redbridge</td>
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<td>Thanet</td>
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<td>Bolton</td>
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<td>Warwickshire</td>
<td>3.7</td>
<td>North Kirklees</td>
<td>4.3</td>
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1 University College London The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset [http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B8-8E6A-FC20D1449163](http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B8-8E6A-FC20D1449163)
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<thead>
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<th>Location</th>
<th>North</th>
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<th>South Norfolk</th>
<th>Darlington</th>
<th>Tameside And Glossop</th>
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<td>3.6 Ashford</td>
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<td>3.5 Fareham And Gosport</td>
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<td>3.3 Merton</td>
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<td>3.3 Bath And North East Somerset</td>
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<td>3.9 Leeds West 5.4 Kingston 6.4</td>
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<td>3.2 Knowsley</td>
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<td>3.9</td>
<td>Southport And Formby 5.3 Rushcliffe 6.4</td>
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<td>Bristol</td>
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<td>3.4 North Staffordshire</td>
<td>3.8 East Surrey 5.2 Sunderland 6.2</td>
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</table>

1 University College London The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset [http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163](http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-FC20D1449163)
Rate of MRSA assigned to Bristol CCG

Bristol CCG had rates that were significantly higher than the England rate in 2012/2013 and 2013/2014.

Rate of MRSA infections per 100,000 in Bristol, Liverpool and the national average

It would appear that the rate of CCG assigned infections have...
reduced steadily over time nationally. In some areas, there has been a dramatic reduction in the rate of infections although this is not statistically significant. Both Bristol and Liverpool rates have fluctuated over time without showing any clear trends in any direction.

Discussion

Data
The data on MRSA cases assigned to CCG should not be used to make comparisons. This is due to variations in case mix, small numbers and organizational changes. This report has looked at the rate of Bristol CCG assigned cases compared to the core cities and national data in order to identify trends and possible explanations. Bristol assigned cases does not seem to have reduced at the same pace as the national average. In order to reduce the rate in 2013/14 to the national average there would need to be 7 cases (current figure is 14).

Assignment of cases to CCG and Trust
There may be variation in practice across the UK which might explain the difference in numbers. The timing of the MRSA is screen is likely to influence whether the case is assigned to the CCG or the Trust. However, it is important to reduce the number of MRSA cases across the health and social care system wherever they occur.
Key themes

There were a number of themes to come from this report that would warrant further investigation

Diabetic patients
There were 3 cases of diabetic patients with foot ulcers. One of these patients was in a care home. Although foot complications are common in diabetes this raises three concerns. Firstly are diabetic patients being adequately managed and is the diabetic foot pathway providing the right care and the right treatment for the right people. As well as the risk of infection and MRSA, foot ulcers are a major predictor of future amputations. Diabetic foot amputations are the most common cause of amputations in the UK. In 2013 Marcus Brooks, Consultant Vascular Surgeon has raised concerns about the rate of minor diabetic amputations in Bristol. 2

Intravenous drug users
There were 9 cases of IVDU. Intravenous drug users are a at risk group for MRSA infections.

Despite a substantial literature-base stating that injection drug users have an elevated risk for carriage of Staphylococcus aureus, including MRSA, no literature could be found offering evidence-based guidance or recommendations for interventions for reducing MRSA specifically in this population.

Patients with previous MRSA infection
There were 9 patients with either a previous infection or medical intervention. It is difficult to determine from the PIR where these patients originally acquired MRSA. It is also not possible to identify whether there are any trends in geographical location or GP practice.

Community MRSA in children
There were 3 children with MRSA. It is difficult to determine from the PIR where these patients originally acquired MRSA.
Recommendations

1. Review foot care in diabetic patients. The scope of this review should include data on amputations, admission to hospital and a review of current patient education and podiatry services. There may be some merit in expanding the review to include the health needs and management of diabetes.

2. Review infection control within the care home settings.

3. Set up a task and finish group to pilot intervention and education project with intravenous drug users. This should include Public Health England, Drugs Project, Public Health and CCG

4. Review the non IVD cases with previous colonalisation to obtain more detailed information on the original infection of MRSA.

5. Explore and investigate the trends on MRSA in Liverpool and Leeds. Identify any areas for good practice in Leeds.

6. Review the structure of the PIR form and make recommendations

7. Review the 3 cases in children to obtain more detailed information on the original source of MRSA
APPENDIX

MRSA in Injecting Drug Users (IDUs): Is there evidence for effective strategies?

The questions addressed by this rapid evidence review are:
- Are there any effective interventions for reducing MRSA in IDUs?
- Are there particular sites which post greater risk for infection?

Methodology
This is a rapid literature review utilising only key articles and the search strategy will have lacked sensitivity. It is not intended to be a systematic literature review of the topic.

Search strategy
a) Data sources:
Data sources searched included: NHS Evidence information portal; Embase and Medline electronic bibliographic databases; Google and Google Scholar search engines; PHE and NICE websites. Citation searches of particularly relevant articles were undertaken.

b) Search terms:
Depending on the limits of the interface with the databases, combinations of the following index terms/free text were used: drug use(r*)/abuse/misuse, MRSA, methicillin-resistant staphylococcus aureus

Results
a) Interventions in MRSA in IDUs
Most literature on infections associated with intravenous drug abuse and their management focuses on HIV, hepatitis A, B and C, and TB.

Despite a substantial literature-base stating that injection drug users have an elevated risk for carriage of Staphylococcus aureus, including MRSA, no literature could be found offering evidence-based guidance or recommendations for interventions for reducing MRSA specifically in this population. There is a dearth of robust evidence on interventions for CA-MRSA.

MRSA Guidance
No relevant guidance could be found from either PHE or NICE. Recently updated guidance from PHE - MRSA: screening and suppression guidance for primary care – covers patients preparing
to have surgery and does not cover CA-MRSA. IDUs are not mentioned¹.

Guidelines for UK practice for the diagnosis and management of methicillin-resistant Staphylococcus aureus (MRSA) infections presenting in the community were published in 2008 on behalf of the British Society for Antimicrobial Chemotherapy (BSAC) Working Party on Community-onset MRSA Infections. Apart from referring to IDUs as being a particularly at risk group, no specific recommendations are made for them.

**IDUs Guidance**

The European Centre for Disease Prevention and Control (ECDC) and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) have produced evidence-based guidance which identifies good practice for prevention and control of infectious diseases among people who inject drugs. The guidance does not differentiate between MRSA and other pathogens causing infections for which people who inject drugs may be at increased risk, but highlights seven recommended key intervention components, some of which will be relevant to MRSA:

1. **Injection equipment**: Provision of, and legal access to, clean drug injection equipment, including sufficient supply of sterile needles and syringes free of charge, as part of a combined multi-component approach, implemented through harm-reduction, counselling and treatment programmes.

2. **Vaccination**: Hepatitis A and B, tetanus, influenza vaccines, and, in particular for HIV-positive individuals, pneumococcal vaccine.

3. **Drug dependence treatment**: Opioid substitution treatment and other effective forms of drug dependence treatment.

4. **Testing**: Voluntary and confidential testing with informed consent for HIV, HCV (HBV for unvaccinated) and other infections including TB should be routinely offered and linked to referral to treatment.

5. **Infectious disease treatment**: Antiviral treatment based on clinical indications for those who are HIV, HBV or HCV infected. Anti-tuberculosis treatment for active TB cases. TB prophylactic therapy should be considered for latent TB cases. Treatment for other infectious diseases should be offered as clinically indicated.

6. **Health promotion**: Health promotion focused on safer injecting behaviour; sexual health, including condom use; and disease prevention, testing and treatment.

¹ University College London. The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset. http://gtr.rcuk.ac.uk/project/1F141BA1-0C1E-42B9-8E6A-F20D1449163

7. **Targeted delivery of services**: Services should be combined and organised and delivered according to user needs and local conditions; this includes the provision of services through outreach and fixed site settings offering drug treatment, harm reduction, counselling and testing, and referrals to general primary health and specialist medical services.

The guidance goes on to suggest that recent studies and experience from successful prevention programmes document the added value of offering a range of effective intervention measures in the same venues, and of providing a combination of interventions according to clients’ needs, to achieve the maximum effect in preventing infections.

The only work to be identified that specifically addressed MRSA in drug users is described but poorly reported in the Nursing Times – and involves a drugs specialist nursing team in Bristol in 2007. Working across primary and secondary care, the range of interventions undertaken by the team did demonstrate a drop in MRSA rates in IDUs, but as this work was not part of a controlled study it is impossible to say whether the drop in rate was due to the team or to other factors.

As national and international guidance fail to draw any distinction between MRSA in IDUs and any other pathogen, it is probably worth looking at the evidence-base behind preventing or reducing rates of any infection in this group. Robust systematic reviews are detailed below:


Background: Injecting drug users are vulnerable to infection with Human Immunodeficiency Virus (HIV) and other blood borne viruses as a result of collective use of injecting equipment as well as sexual behaviour Objectives: To assess the effect of oral substitution treatment for opioid dependent injecting drug users on risk behaviours and rates of HIV infections Search methods: We searched the Cochrane Central Register of Controlled Trials, MEDLINE, EMBASE and PsycINFO to May 2011. We also searched reference lists of articles, reviews and conference abstracts Selection criteria: Studies were required to consider the incidence of risk behaviours, or the incidence of HIV infection related to substitution treatment of opioid dependence. All types of original studies were considered. Two authors independently assessed each
study for inclusion Data collection and analysis: Two authors independently extracted key information from each of the included studies. Any differences were resolved by discussion or by referral to a third author. Main results: Thirty-eight studies, involving some 12,400 participants, were included. The majority were descriptive studies, or randomisation processes did not relate to the data extracted, and most studies were judged to be at high risk of bias. Studies consistently show that oral substitution treatment for opioid-dependent injecting drug users with methadone or buprenorphine is associated with statistically significant reductions in illicit opioid use, injecting use and sharing of injecting equipment. It is also associated with reductions in the proportion of injecting drug users reporting multiple sex partners or exchanges of sex for drugs or money, but has little effect on condom use. It appears that the reductions in risk behaviours related to drug use do translate into reductions in cases of HIV infection. However, because of the high risk of bias and variability in several aspects of the studies, combined totals were not calculated. Authors' conclusions: Oral substitution treatment for injecting opioid users reduces drug-related behaviours with a high risk of HIV transmission, but has less effect on sex-related risk behaviours. The lack of data from randomised controlled studies limits the strength of the evidence presented in this review.

Meader N, Li R, Des Jarlais DC et al 2010 Psychosocial interventions for reducing injection and sexual risk behaviour for preventing HIV in drug users Cochrane Database of Systematic Reviews 2010 NO: 1 Art. No.: CD007192. DOI: 10.1002/14651858.CD007192.pub2

Background: Drug users (including both injection drug users and crack cocaine users), are at high levels of risk for contracting HIV. Therefore it is important to reduce the injection and/or sexual risk behaviours of these groups both for the benefit of themselves and for society as a whole. Objectives: To assess the efficacy of multi-session psychosocial interventions in comparison with standard education and minimal intervention controls for the reduction of injection and sexual risk behaviour. Search methods: Electronic searches were conducted of a number of bibliographic databases (including Cochrane Library, CINAHL, MEDLINE, PsycINFO). In addition, other methods of locating papers were employed including contacting various authors working in the field of HIV risk reduction and examining reference lists of applicable papers identified in the electronic search. Selection criteria: The inclusion criteria consisted

1 University College London The epidemiology of community acquired Methicillin Resistant Staphylococcus aureus (MRSA) and severe community onset. http://gtr.rcuk.ac.uk/project/1F141BA1-D0E1-42B9-966A-FE20DD4916D
2 Avon Education http://www.avongpeducation.co.uk/handouts/2013/cardiology/Diabetic%20Foot%20Disease.pdf
of randomised and quasi-randomised trials assessing the efficacy of psychosocial interventions in the reduction of injection and sexual risk behaviour for people who misused opiates, cocaine, or a combination of these drugs. Data collection and analysis: Two authors independently assessed the eligibility of studies identified by the search strategy, quality assessed these studies and extracted the data. A total of 35 trials met the eligibility criteria of the review providing data on 11,867 participants. Main results: There were minimal differences identified between multi-session psychosocial interventions and standard educational interventions for both injection and sexual risk behaviour. Although it should be noted there were large pre-post changes for both groups suggesting both were effective in reducing risk behaviours. In addition, there was some evidence of benefit for multi-session psychosocial interventions when compared with minimal controls. Subgroup analyses suggest that people in formal treatment are likely to respond to multi-session psychosocial interventions. It also appears single-gender groups may be associated with greater benefit. Authors' conclusions: There is limited support for the widespread use of formal multi-session psychosocial interventions for reducing injection and sexual risk behaviour. Brief standard education interventions appear to be a more cost-effective option. Further research is required to assess if there are particular groups of drug users more likely to respond to such interventions.


Other SRs
The authors concluded there was evidence to support the effectiveness of needle and syringe programmes in reducing the transmission of HIV among people who inject drugs, but these should be considered as one component of a programme of interventions. The authors' conclusions accurately reflected the evidence and their recommendations should be considered reliable in the absence of randomised studies.

This generally well-conducted review concluded that opiate substitution as maintenance therapy reduced the risk of HIV infection among people who inject drugs. The authors acknowledged the limitations of the evidence, and that high levels of motivation to change behaviour participants of such studies may mean the results were not generalisable.


This review concluded that behavioural interventions did not significantly reduce hepatitis C virus transmission in people who inject illicit drugs. Compared to control, peer education interventions significantly reduced injecting-related risk behaviours whereas counselling did not. In view of the limited evidence and apparent reporting errors in the review, the authors' conclusions should be treated with caution.


This review concluded that uptake of opiate substitution therapy and high coverage of needle and syringe programmes could substantially reduce the risk of hepatitis C virus transmission among injecting drug users. The lack of quality assessment of included studies and the limited number of participants for whom complete data were available mean that these conclusions may not be reliable.


This “review of reviews” found that review-level evidence indicates that harm reduction interventions can reduce injecting risk behaviour, with evidence strongest for opiate substitution treatment and needle and syringe programmes. However, there is comparatively little review-level evidence regarding the effectiveness of these interventions in preventing HCV transmission among IDUs.

A further RCT has been published since the SRs above were conducted and which therefore has not been included in them:
A new skin and needle hygiene intervention, designed to reduce high-risk injection practices associated with bacterial and viral infections, was tested in a pilot, randomized controlled trial. Participants included 48 active heroin injectors recruited through street outreach and randomized to either a 2-session intervention or an assessment-only condition (AO) and followed up for 6 months. The primary outcome was skin- and needle-cleaning behavioral skills measured by videotaped demonstration. Secondary outcomes were high-risk injection practices, intramuscular injection, and bacterial infections. Intervention participants had greater improvements on the skin (d = 1.00) and needle-cleaning demonstrations (d = .52) and larger reductions in high-risk injection practices (d = .32) and intramuscular injection (d = .29), with a lower incidence rate of bacterial infections (hazard ratio = .80), at 6 months compared with AO. The new intervention appears feasible and promising as a brief intervention to reduce bacterial and viral risks associated with drug injection.

A further study highlights the attitudes and perceptions of IDUs to risk reduction strategies:
Phillips KT, Altman JK, Corsi KF, Stein MD 2013 Development of a Risk Reduction Intervention to Reduce Bacterial and Viral Infections for Injection Drug Users Substance Use & Misuse 48(1-2): 54-64 Bacterial infections are widespread problems among drug injectors, requiring novel preventive intervention. As part of a NIDA-funded study, we developed an intervention based on the Information-Motivation-Behavioral Skills model, past research, injection hygiene protocols, and data collected from focus groups with 32 injectors in Denver in 2009. Qualitative responses from focus groups indicated that most participants had experienced skin abscesses and believed that bacterial infections were commonly a result of drug cut, injecting intramuscularly, and reusing needles. Access to injection supplies and experiencing withdrawal were the most frequently reported barriers to utilizing risk reduction. Implications for intervention development are discussed.

b) Sites of infection
Studies were found describing a range of MRSA-associated infections involving different sites, although there was no indication that any one posed a greater risk than another.
European guidance\(^5\) states that whilst most infections are minor, they can also become serious and systemic, resulting in osteomyelitis, bacteremia, septic deep-vein thrombosis, and endocarditis\(^2\)\(^v\)\(^vi\).

Additional evidence of other sites was found in other studies reporting MRSA-associated infection in mycotic aneurysms of the common and superficial femoral arteries\(^vii\), primary spinal infections\(^viii\)\(^ ix\) and pyomyositis\(^x\).

Dr Christina Maslen  
Clinical Effectiveness Research Lead  
Public Health, Bristol City Council

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\(^2\) [http://jac.oxfordjournals.org/content/61/5/976.full.pdf](http://jac.oxfordjournals.org/content/61/5/976.full.pdf)

\(^3\) ECDC and EMCDDA Guidance Prevention and control of infectious diseases among people who inject drugs European Centre for Disease Prevention and Control, 12 October 2011  


\(^6\) Belton P, Sharngoe T, Maguire M, Polhemus M 2013 Cardiac Infection and Sepsis in 3 Intravenous Bath Salts Drug Users Clinical Infectious Diseases 56(11): 102–104


\(^9\) Ziu M, Dengler B Cordell D, Bartanusz V 2014 Diagnosis and management of primary pyogenic spinal infections in intravenous recreational drug users Neurosurgical Focus 37(2): E3

\(^x\) Fowler A, Mackay A 2006 Community-acquired methicillin-resistant Staphylococcus aureus pyomyositis in an intravenous drug user Journal of Medical Microbiology 55(1): 123-125
### 1. Review foot care in diabetic patients.
The scope of this review should include data on amputations, admission to hospital and a review of current patient education and podiatry services. There may be some merit in expanding the review to include the health needs and management of diabetes.

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Action No</th>
<th>Action</th>
<th>Outcome required</th>
<th>RO</th>
<th>Timescale</th>
<th>notes / progress</th>
</tr>
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<tbody>
<tr>
<td>1a</td>
<td>Identify funding for secondee</td>
<td>Funding identified</td>
<td>L Scott</td>
<td>Oct-14</td>
<td>20/10/2014</td>
<td>Funding identified</td>
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<tr>
<td>1b</td>
<td>Recruit and appoint a community/primary care nurse to lead the action plan for NH &amp; RH, liaise with community providers and liaise with Avon LMC for practice nurses</td>
<td>Appointment for one year for Bristol and SG</td>
<td>B James</td>
<td>By end Jan 14</td>
<td>20/10/2014</td>
<td>JDs from DGIOS requested by LS</td>
</tr>
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</table>
| 1c             | Clarify best practice in diabetic foot care & leg ulcers for the community [community providers, NH & RH, and general practice]. | a. A common understanding between community care providers, nursing & residential home providers and general practice on standards & practice.  
   b. Agreement on the delivery of an awareness programme regarding the standards & expectations | Seconded Nurse | Feb - April 2015 |
| 1d             | Coordinate the dissemination of the standards with community providers and LMC for general practice, and lead on dissemination in NH & RH sector | a. Record of sessions into all NH &RHs.  
   b. Community Provider[s] assurance of acceptance and dissemination of stds.  
   c. LMC assurance of dissemination to practice nurses | Seconded Nurse | May - Dec 2015 |

**Overall outcome**: There is no pre 48 hour MRSA with RCA relating it to community / primary care diabetic foot ulcers or leg ulcers.

### 2. Review infection control within the care home settings.

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<th>Action No</th>
<th>Action</th>
<th>Outcome required</th>
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<th>notes / progress</th>
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<tr>
<td>2b</td>
<td>Coordinate action plan arising from above</td>
<td>Action plan with deliverables in place</td>
<td>Seconded Nurse</td>
<td>Apr - Dec 2015</td>
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### 3. Set up a task and finish group to pilot intervention and education project with intravenous drug users. This should include Public Health England, Drugs Project, Public Health and CCG

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<thead>
<tr>
<th>Recommendation</th>
<th>Action No</th>
<th>Action</th>
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<th>RO</th>
<th>Timescale</th>
<th>notes / progress</th>
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<tr>
<td>3a</td>
<td>Establish task and finish group</td>
<td>Task and finish group with agreed terms of reference in place for 2015</td>
<td>A Moon</td>
<td>Jan-15</td>
<td></td>
<td></td>
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<tr>
<td>3b</td>
<td>Coordinate action plan arising from above</td>
<td>Action plan with deliverables in place</td>
<td>tbc</td>
<td>Feb - Dec 2015</td>
<td>Overall outcome is reduced incidence of pre 48 hour MRSA relating to IVDU population</td>
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<tr>
<td>4. Review the non IVD cases cases to obtain more detailed information on the original infection of MRSA.</td>
<td>4</td>
<td>Review non IVD cases case notes</td>
<td>More detail and information on the original infection obtained</td>
<td>L Roberts</td>
<td>Dec 14 - Feb 15</td>
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<td>5. Explore and investigate the trends on MRSA in Liverpool and Leeds. Identify any areas for good practice in Leeds.</td>
<td>5</td>
<td>Contact Leeds and Liverpool to explore and investigate similarities between cities and Bristol, and / or any learning for Bristol</td>
<td>Learning from Leeds and Liverpool to inform Bristol action plan</td>
<td>J Allan</td>
<td>Nov 14 - Feb 15</td>
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<tr>
<td>6. Review the structure of the PIR form and make recommendations</td>
<td>6</td>
<td>Review and advise LS and AM of any recommendations</td>
<td>More informative and effective PIR process</td>
<td>M Davies and B James</td>
<td>Jan-15</td>
<td></td>
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<tr>
<td>7a. Review the 3 cases in children to obtain more detailed information on the original source of MRSA</td>
<td>7a</td>
<td>Review the 3 cases and advise LS &amp; AM of any recommendations</td>
<td>Information to inform the local and national processes for children</td>
<td>L Roberts</td>
<td>Nov 14 - Feb 15</td>
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<tr>
<td>7b</td>
<td>Review the Dept of Health MRSA modified screening guidance 2014 vis a vis children</td>
<td>Advice to LS and AM on current national position on screening in children</td>
<td>M Davies</td>
<td>By end Dec 14</td>
<td></td>
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<tr>
<td>8. Review MRSA admission screening with Providers</td>
<td>8a</td>
<td>Department of Health revised guidelines on admission screening, no further ‘blanket’ screening</td>
<td>Ensure risk assessment includes patients identified in post infection reviews</td>
<td>J Allan</td>
<td>By end Mar 15</td>
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<tr>
<td>9. Other actions</td>
<td>9.1</td>
<td>Gain clarification on the process &amp; decision making for assigning attributable cases</td>
<td>A consistent &amp; shared understanding of the process and decision making process</td>
<td>M Davies</td>
<td>By end Dec 14</td>
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