Implementing a care bundle to reduce *Staphylococcus aureus* bloodstream infections associated with peripheral intravenous cannulae: experience at a large Australian health service

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Conflicts of interest

None to declare
Acknowledgements

Alfred Health Patients & Clinical Staff

Mr. Andrew Way (CEO)

Alfred Health Infection Prevention Committee

Infection Prevention & Healthcare Epidemiology Unit
Alfred Health

- Metropolitan health service
- 860 beds
- 3 campuses
Staphylococcus aureus bacteraemia (SAB)

• Morbidity and mortality
• Impact on healthcare resources
• Healthcare associated (HA-SAB)
• Signal event letters (root cause analysis)
Definitions – PIVC associated HA-SAB

- Infectious Diseases Physician review
  - PIVC insitu or removed within 48 hours
  - No other site of *S. aureus* infection
  - Swab not needed to fit definition
  - Presence of phlebitis not a determinant
Background - 2012

- Emerging trend
- 40 HA-SABs
- 40% PIVC associated (16)
Aims & Objectives

- Prevent PIVC associated SABs
  - Evidence based literature review
  - Examine insertion & management
  - Implement improvements
  - Streamline PIVC insertion training
Methods

• Executive approval
• Project co-ordinator
  ✔ 0.5 EFT x 2 years
• Working group (key areas)
• Audit & interventions
# Pre-intervention - insertion audit

<table>
<thead>
<tr>
<th>Wards (excluding Operating Theatres) n = 32</th>
<th>Compliance%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trolley cleaned before use</td>
<td>14%</td>
</tr>
<tr>
<td>Dressing pack use</td>
<td>84%</td>
</tr>
<tr>
<td>Chlorhexidine w 70% alcohol skin prep</td>
<td>81%</td>
</tr>
<tr>
<td>Insertion site not touched after cleaning</td>
<td>77%</td>
</tr>
<tr>
<td>Hand hygiene – Moment 2</td>
<td>53%</td>
</tr>
</tbody>
</table>
Pre-intervention – management audit

- Point prevalence
- All inpatients
- 2 – 3 weeks of auditing
Education – by Infection Prevention

• Cannulation training
  ✓ Interim e-learning package
  ✓ DVD
  ✓ Nursing Education handover

• Intern orientation

• Assessor refresher

• Audit result feedback
Phlebitis Score:
For the assessment of peripheral IV cannulae.

- No pain, heat, redness or swelling. Score 0
  - Remove cannula if not required. Monitor cannula site every shift and when accessing line.

- Slight pain, slight redness (<2cm) at cannula site. Score 1
  - Remove cannula if not required, or consider replacement. Monitor cannula site every shift and when accessing line.

- Pain with redness, heat or swelling at cannula site. Score 2
  - Remove cannula. Notify Medical Team.

- Pain, redness, heat or swelling with exudate, hardening, a palpable venous cord, or tissue damage at cannula site. Score 3
  - Remove cannula. Notify medical team. Send swab of exudate and blood cultures if clinically indicated. Submit Riskman.

Insertion documentation

Peripheral IV Cannulation
Size/colour: __________________

☐ LEFT           ☐ RIGHT
☐ Hand          ☐ Wrist         ☐ ACF
☐ Forearm       ☐ Lower forearm
☐ Upper forearm ☐ Upper arm
☐ Other

Inserted by (sign) __________________
Date: ___________  Time: ___________
24 hour removal sticker
GUIDELINE

Peripheral Intravenous Cannulation & Ongoing Management

Title: Guideline: Adults

TARGET AUDIENCE

Alfred Health clinical staff, visiting medical officers and selected students who will be responsible for performing peripheral intravenous cannulation, and those staff who manage patients receiving peripheral intravenous therapy.

PURPOSE

This guideline describes the recommendations and expected practice related to the insertion and management of peripheral intravenous cannulae.

Clinicians wishing to perform peripheral intravenous cannulation at Alfred Health must familiarise themselves with the requirements outlined in Appendices I & II.

DEFINITION

Peripheral intravenous cannulation (PIVC) refers to the insertion of an indwelling, short, hollow plastic tube into a vein to enable direct access to the bloodstream.

PIVC is one of the most commonly performed invasive procedures for hospitalised patients. It is associated with a risk of harm, as well as physical and sometimes psychological discomfort and should only be undertaken when necessary.

PIVC also poses potential risks to healthcare workers (HCWs) through the exposure to blood/body fluids. The following guidelines available on PROMPT present strategies for the minimisation of this risk:

- Personal Protective Equipment (PPE) for Preventing Healthcare Associated Infection
- Management of Occupational Blood or Body Fluid Exposures at Alfred Health
- Alfred Health Waste Management
## Results: Processes

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertion date on dressing</td>
<td>60/272 (22.1%)</td>
<td>86/279 (30.8%)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Name of HCW inserting PIVC recorded</td>
<td>55/272 (20.2%)</td>
<td>87/279 (31.2%)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>PIVC observation chart commenced</td>
<td>107/256 (41.8%)</td>
<td>161/241 (66.8%)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Avoidance of cubital fossa</td>
<td>102/273 (37.4%)</td>
<td>88/279 (31.5%)</td>
<td>0.15</td>
</tr>
</tbody>
</table>
PIVC Management Audit 2013/2014 - Pre and Post Comparison
Phlebitis Score (Auditor Assessment)

Phlebitis Score

<table>
<thead>
<tr>
<th>Phlebitis Score</th>
<th>Number Pre Intervention (n=272)</th>
<th>Number Post Intervention (n=279)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>211 (78%)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>54 (20%)</td>
<td>20 (7%)</td>
</tr>
<tr>
<td>2</td>
<td>5 (2%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>3</td>
<td>2 (1%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>
PIVC Management Audit 2013/2014 - Pre and Post
Number of Days Insitu

- **Number Pre Intervention (n=233)**
- **Number Post Intervention (n=270)**

### Number of patients

<table>
<thead>
<tr>
<th>Number of days</th>
<th>0 days</th>
<th>1 day</th>
<th>2 days</th>
<th>3 days</th>
<th>4 days</th>
<th>5 days</th>
<th>6 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Percentage</strong></td>
<td>16%</td>
<td>48%</td>
<td>21%</td>
<td>8%</td>
<td>5%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Absolute</strong></td>
<td>37</td>
<td>112</td>
<td>101</td>
<td>18</td>
<td>12</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Number of Patients and Percentage for Each Day:

- **0 days**: 37 (16%)
- **1 day**: 112 (48%)
- **2 days**: 101 (37%)
- **3 days**: 18 (8%)
- **4 days**: 12 (5%)
- **5 days**: 2 (1%)
- **6 days**: 2 (1%)
PIVC Management Audit 2013/2014 - Pre and Post Comparison
Number of Recorded Phlebitis Checks in the Last 24 Hours

Number Pre Intervention (n=257)  Number Post Intervention (n=274)

<table>
<thead>
<tr>
<th>Number of Checks</th>
<th>Pre Int.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Checks</td>
<td>198 (77%)</td>
</tr>
<tr>
<td>1 Check</td>
<td>133 (49%)</td>
</tr>
<tr>
<td>2 Checks</td>
<td>46 (18%)</td>
</tr>
<tr>
<td>3 Checks</td>
<td>70 (26%)</td>
</tr>
<tr>
<td>4 Checks</td>
<td>6 (2%)</td>
</tr>
<tr>
<td>5 or more Checks</td>
<td>21 (8%)</td>
</tr>
</tbody>
</table>
Results: Outcome

$p$ value = 0.035

40 HA-SABs  
40% PIVC associated

32 HA-SABs  
18.8% PIVC associated
**Staphylococcus aureus** bloodstream infections

![Bar chart showing infection rates over years](image)

- **2010-11**: 1.48 cases per 10,000 bed days
- **2011-12**: 1.58 cases per 10,000 bed days
- **2012-13**: 1.39 cases per 10,000 bed days
- **2013-14**: 1.13 cases per 10,000 bed days

*Informing patients, supporting clinicians, driving improvements*
Challenges & Limitations

- Staff turnover
- 72 hour rule
- Failure to comply with insertion recommendations
- What was it that worked?
PIVC associated SABs

PIVC associated SABs
Dec 2011 - Nov 2015
Looking forward…

• Embedding of new guideline

• Auditing and feedback: insertion and management
  - Point of care audits
  - Project sustainability role

• Implementation of the new training module
Did we meet our aims & objectives?

<table>
<thead>
<tr>
<th>Implemented improved processes</th>
<th>Successful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streamlined PIVC insertion training</td>
<td>Ready to go!</td>
</tr>
<tr>
<td>Prevented 10 SABs in 12 months</td>
<td>Saved $105,000¹ (net)</td>
</tr>
</tbody>
</table>

Thank you!

- Gavin Hawkins – Public Affairs
- Andrew Jackson (RN)
- Peter Holloway – Holloway Productions