## Bone Cement Implantation Syndrome

**Department / Service:** Anaesthetic department  
**Originator:** Lucy Leong/ Alag Raajkumar/ Charlie Docker  
**Accountable Director:** David Whitelock  
**Approved by:** Anaesthetics and Critical Care Governance meeting  
**Date of Approval:** 17th January 2019  
**Review Date:** 17th January 2021

This is the most current document and should be used until a revised version is in place.

**Target Organisation(s):** Worcestershire Acute Hospitals NHS Trust  
**Target Departments:** Anaesthetic Directorate, Main theatres and T and O Directorate  
**Target staff categories:** Anaesthetists, theatre nurses, ODP’s, HCA and T and O surgeons

### Policy Overview:

Bone Cement Implantation Syndrome Policy

### Latest Amendments to this policy:

17th January 2019 – Document reviewed with no changes required by Dr Lucy Leong
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1. **Introduction**
The purpose of this document is to reduce the risk from cemented hemiarthroplasty by encouraging joint decision making, teamwork and attention to detail.

The National Patient Safety Agency (NPSA) has issued an alert in the past and subsequently Anaesthetic Sprint Audit of Practice (ASAP) collected prospective information on bone cement implantation syndrome (BCIS). This audit revealed evidence of cardiovascular compromise in some patients undergoing cemented hemiarthroplasty for hip fracture.

In the trust there have been cases of BCIS which have resulted in cardiovascular collapse requiring resuscitation.

2. **Scope of this document**
This policy will initially cover all cemented hemiarthroplasty's performed in the trauma theatres at the Alexandra and Worcester Hospital sites. If necessary will be rolled out to other sites in the trust.

3. **Definitions**
Bone cement implantation syndrome (BCIS) is characterized by hypoxia, hypotension or both and/or unexpected loss of consciousness if patient is awake. This can occur around the time of cementation, prosthesis insertion, reduction of the joint or, occasionally, limb tourniquet deflation in a patient undergoing cemented bone surgery. Possibility of Bone Cement Implantation Syndrome occurred in approximately 20% of operations in which a cemented prosthesis was used.

**Incidence of adverse effects during arthroplasty using cemented prosthesis**

Grade 1 (hypoxia <94% or hypotension >20% fall in systolic blood pressure) 20%

Grade 2 (hypoxia <88% or hypotension >40% fall in systolic pressure or loss of consciousness) 3%

Grade 3 Cardiovascular collapse requiring resuscitation in 1%

Certain patient factors associated with increased risk of severe cardiovascular events during cemented hemiarthroplasty:

1. Increasing age
2. Male sex
3. Significant cardiopulmonary disease
4. Use of diuretic medication

4. **Responsibility and Duties**
Surgeons and anaesthetist can modify their preoperative practice to reduce the risk of cardiovascular events and to improve the outcome following an event.
All members of the theatre team should be aware of the problems with femoral instrumentation and cemented prosthesis.

5. Policy detail
The potential for adverse events should be identified for each patient as part of the pre-list briefing before starting the theatre list and the World Health Organization (WHO) safe surgery checklist ‘time –out’.

Cement Curfew
1. Identifying cases on the trauma list requiring Cement Curfew i.e. cemented hips.
2. Discuss cementing technique i.e. is cementing appropriate?
3. Does the anaesthetist need invasive monitoring? Cardiac output/"A" line/CVP line.
4. At the end of time out, assign roles to theatre team members.
5. Mark name against roles on cement curfew sheet/laminated card/white board/ name badges.
6. All members of the theatre team with assigned roles should be available in theatre.
7. Distractions-e.g. - like music to be minimised at the time of the cement curfew.
8. When cement is prepared for mixing, the scrub nurse informs the team that the cement curfew is about to start.
9. Lead surgeon informs the team when the cement is about to be inserted.
10. Lead anaesthetist ensures that the patient has a good cardiac output and increases the frequency of blood pressure measurement to stat/every 2.5 minutes in case of non-invasive method and confirms that the patient is ready for the cement insertion.
11. Cement is inserted with a third generation technique usually without excessive pressurization.
12. Lead surgeon informs team when the prosthesis is being inserted.
13. Lead surgeon informs the team when the hip is relocated.

6. Implementation
6.1 Plan for implementation
[A brief description of the plan for dissemination]
Communication via theatre band 7-8 to disseminate information to theatre staff
Case presented at anaesthetic directorate QIM meeting

6.2 Dissemination
Communicated to T and O directorate clinical director. Also to provide simulation training for T and O directorate.
6.3 Training and awareness
Training on bone cement implantation syndrome will be provided via simulation training on audit
days by Dr L Leong/ Dr A Raakkumar

[This section should refer to training as identified in the Trusts Training Needs Analysis
Appendix A of the Trusts Mandatory Training Policy.]

7. Monitoring and compliance

[This section should identify how the Trusts plan to monitor compliance with and the
effectiveness of this Policy. It should include auditable standards and/or key performance
indicators (KPIs) and details on the methods for monitoring compliance]

The NHSLA requirements are –

Organisations should measure, monitor and evaluate compliance with the minimum
requirements within the NHSLA Risk Management Standards. This should include the use of
audits and data related to the minimum requirements. The organisation should define the
frequency and detail of the measurement, monitoring and evaluation processes.

Monitoring demonstrates whether or not the process for managing risk, as described in the
approved documentation, is working across the entire organisation. Where failings have been
identified, action plans must have been drawn up and changes made to reduce the risks.
Monitoring is normally proactive - designed to highlight issues before an incident occurs - and
should consider both positive and negative aspects of a process.

The table below should help to detail the ‘Who, What, Where and How’ for the monitoring of this
Policy.
<table>
<thead>
<tr>
<th>Page/ Section of Key Document</th>
<th>Key control: Checks to be carried out to confirm compliance with the Policy:</th>
<th>How often the check will be carried out:</th>
<th>Responsible for carrying out the check: (Responsible for also ensuring actions are developed to address any areas of non-compliance)</th>
<th>Results of check reported to:</th>
<th>Frequency of reporting:</th>
</tr>
</thead>
<tbody>
<tr>
<td>These are the ‘key’ parts of the process that we are relying on to manage risk. We may not be able to monitor every part of the process, but we MUST monitor the key elements, otherwise we won’t know whether we are keeping patients, visitors and/or staff safe.</td>
<td>What are we going to do to make sure the key parts of the process we have identified are being followed? (Some techniques to consider are; audits, spot-checks, analysis of incident trends, monitoring of attendance at training.)</td>
<td>Be realistic. Set achievable frequencies. Use terms such as ‘10 times a year’ instead of ‘monthly’.</td>
<td>Who is responsible for the check? Is it listed in the ‘duties’ section of the Policy? Is it in the job description?</td>
<td>Who will receive the monitoring results? Where this is a committee the committee’s specific responsibility for monitoring the process must be described within its terms of reference.</td>
<td>Use terms such as ‘10 times a year’ instead of ‘monthly’.</td>
</tr>
</tbody>
</table>
8. **Policy Review**

This policy should be reviewed 3 yearly.
Dr L Leong, A Raajkumar and Mr C Docker are responsible for this policy

[This section should state the frequency of review of the Policy and which person or group will be responsible]

9. **References** [You should include external source documents and other Trust documents that are related to this Policy]

**References:**


10. **Background**

10.1 **Equality requirements**

[A brief description of the findings of the equality assessment Supporting Document 1]

10.2 **Financial risk assessment**

[A brief description of the financial risk assessment Supporting Document 2]

10.3 **Consultation**

[This section should describe an appropriate consultation process which should involve stakeholders]

**Contribution List**

This key document has been circulated to the following individuals for consultation:

<table>
<thead>
<tr>
<th>Designation</th>
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</table>
This key document has been circulated to the chair(s) of the following committee’s / groups for comments;

<table>
<thead>
<tr>
<th>Committee</th>
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</table>

10.4 Approval Process
This section should describe the internal process for the approval and ratification of this Policy.
Supporting Document 1 - Equality Impact Assessment Tool

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

<table>
<thead>
<tr>
<th></th>
<th>Yes/No</th>
<th>Comments</th>
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<tbody>
<tr>
<td>1.</td>
<td>Does the Policy/guidance affect one group less or more favourably than another on the basis of:</td>
<td></td>
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<tr>
<td></td>
<td>Race</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Ethnic origins (including gypsies and travellers)</td>
<td>No</td>
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<td></td>
<td>Nationality</td>
<td>No</td>
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<td></td>
<td>Gender</td>
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<td></td>
<td>Culture</td>
<td>No</td>
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<tr>
<td></td>
<td>Religion or belief</td>
<td>No</td>
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<tr>
<td></td>
<td>Sexual orientation including lesbian, gay and bisexual people</td>
<td>No</td>
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<tr>
<td></td>
<td>Age</td>
<td>No</td>
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<td>2.</td>
<td>Is there any evidence that some groups are affected differently?</td>
<td>No</td>
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<tr>
<td>3.</td>
<td>If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?</td>
<td>No</td>
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<tr>
<td>4.</td>
<td>Is the impact of the Policy/guidance likely to be negative?</td>
<td>No</td>
</tr>
<tr>
<td>5.</td>
<td>If so can the impact be avoided?</td>
<td>No</td>
</tr>
<tr>
<td>6.</td>
<td>What alternatives are there to achieving the Policy/guidance without the impact?</td>
<td>No</td>
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<tr>
<td>7.</td>
<td>Can we reduce the impact by taking different action?</td>
<td>No</td>
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</tbody>
</table>

If you have identified a potential discriminatory impact of this key document, please refer it to Assistant Manager of Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

For advice in respect of answering the above questions, please contact Assistant Manager of Human Resources.
Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

<table>
<thead>
<tr>
<th>Title of document:</th>
<th>Yes/No</th>
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<tbody>
<tr>
<td>1. Does the implementation of this document require any additional Capital resources</td>
<td>No</td>
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<td>2. Does the implementation of this document require additional revenue</td>
<td>No</td>
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<td>3. Does the implementation of this document require additional manpower</td>
<td>No</td>
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<tr>
<td>4. Does the implementation of this document release any manpower costs through a change in practice</td>
<td>No</td>
</tr>
<tr>
<td>5. Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff</td>
<td>No</td>
</tr>
</tbody>
</table>

Other comments:

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval.