

Original Article

Operating room team's perception of procedure shift to cemented hemiarthroplasty

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Dan Med J 2024;71(11):A02240143. doi: 10.61409/A02240143

ABSTRACT

INTRODUCTION. A procedural change in the treatment of patients with femoral neck fracture from uncemented to cemented hemiarthroplasty was to be implemented to follow new national guidelines. In accordance with implementation science, it is important to understand the team's thoughts and educational needs. The study aimed to explore surgeons', scrub nurses', anaesthesiologists' and anaesthesia nurses' perceptions of barriers and facilitators to foster a safe educational introduction.

METHODS. We conducted four semi-structured group interviews with 15 team members. The interviews were recorded, transcribed, and analysed using systematic text condensation to define important factors.

RESULTS. We found barriers, e.g., potential fear related to handling the cement and "thoughts" concerning limited time. Patient, individual and organisational factors were also identified. A "cement-time-out" was suggested to prepare and complete cementation safely. The interviewees emphasised continuous training to ensure the procedure's success and maintain skills and confidence after the initial training. The importance of a safe learning culture, team collaboration and the provision of feedback was discussed.

CONCLUSIONS. The study provides novel insights into the specific educational needs that may arise during the transition to cemented hemiarthroplasty. A training package including simulation was proposed to maintain a safe learning environment and ensure patient safety. The team highlighted the importance of maintaining their competence. Results are relevant for departments introducing procedural change.

FUNDING. None.

TRIAL REGISTRATION. Not relevant.

Recently, the Danish Orthopaedic Society implemented a new guideline recommending the use of cemented hemiarthroplasty (HA) in the treatment of patients with displaced acute femoral neck fractures. This recommendation was based on studies showing a significantly reduced number of reoperations after cemented HA compared with uncemented HA [1-3]. Changing practice to a cemented procedure requires specific qualifications in the surgical team and motivation for altering the treatment. Literature on preparing all team members for this type of change in procedure is limited. The time available for working with the cement applied to the femur before it starts to harden is limited.

Moreover, the procedure may increase the risk of known cardiovascular complications in cemented HA, which requires management by the anaesthesia team [4, 5]. To design and develop a safe and successful implementation of the new procedure, the department decided to explore each team member's experiences, expectations and educational needs. This process created an open learning space where team members could support each other in the transition phase.

This study aimed to explore surgeons', scrub nurses', anaesthesiologists' and nurse anaesthetist' perceptions of barriers and facilitators and educational needs in relation to the change of procedure from uncemented to cemented HA in the treatment of patients with femoral neck fracture.

METHODS

This study was designed as an exploratory, semi-structured group interview study conducted over a month at a single department of a Danish university hospital. Group interviews were chosen to actively engage participants in discussions, inspire with comments and create a space for open debate. Interviews were analysed following Braun and Clarke's approach to reflexive thematic analyses, generating codes and thematic maps to define themes and sub-themes. These themes and sub-themes were subsequently presented to the project group, including the clinical management [6].

The participants were invited by the heads of section. They received information about the topics before the interview was conducted. All trauma surgeons at the department, a representative group of scrub nurses and anaesthesia team members were interviewed.

Interview

An interview guide was developed and pilot tested ([Appendix A](#)). The interviews were semi-structured and lasted approx. 75 minutes each. The interviews were conducted by MDM and DO, either of whom worked in the department.

Data analysis

The interviews were audio-recorded, transcribed and anonymised. After familiarising ourselves with the data, initial codes were generated by MDM and discussed by authors. Themes were identified, clustered based on similarity in meaning and then broken down into subthemes. This study was reported according to the Consolidated Criteria for Reporting Qualitative research Checklist ([See Appendix B](#)) [7].

Ethical approval

The protocol was submitted for ethical approval, reference number 80538. Participation was accepted orally, and written informed consent was obtained before the interviews. Data were handled and stored according to the Danish Data Protection Act and the General Data Protection Regulation.

Trial registration: not relevant.

RESULTS

A total of four group interviews were conducted, including seven surgeons, six scrub nurses, one anaesthesiologist and one nurse anaesthetist. Three of the interviews were mono-professional, with two comprised of surgeons, one interview involving scrub nurses and the fourth interview involving the full operation room (OR) team.

Experience and expectations regarding the procedure

We identified four themes: the procedure in general, patient-related, individual, and organisational factors (Table 1). The subthemes identified were challenges regarding the cement, stem and individual factors, e.g., limited time to perform the procedure before the cement hardens (polymerisation), which is very different from the usual procedure. In addition, some were worried about the initial training, i.e. there might not be sufficient training opportunities to reach and maintain their competencies before new residents were to be trained. The scrub nurses were worried about cement mixing. The organisational challenges were primarily a lack of competencies and worries about difficulties in maintaining these (Table 2).

TABLE 1 Procedural, patient-related, individual, and organisational factors of importance regarding acute trauma.

Factor	Descriptions
<i>Procedure in general</i>	
Cement	The whole team has short time from the mixing of cement by hand and until it has solidified 10-12 min. later Nurses are concerned about mixing incorrectly The time factor – feeling a lack of time It is a "one-shot" procedure The temperature in the room can affect how the cement hardens
Stem	Difficult to do it accurately If the stem is in the incorrect position, you cannot change it The stem moves and loosens The stem does not fit into the canal
<i>Patient-related factors</i>	
	More complicated than elective operations Complex anatomy, unpredictable, more chaotic, typically bleeds much The femoral neck does not break evenly, and you need to make precise cuts Bone quality is typically poorer ^a
<i>Individual factors</i>	
Experience	Lack of experience and skills Insecurity/uncertainty about limited time and experience during surgery
Motivation	Nurses find cement mixing unpopular
Allergy	Allergy to cement
<i>Organisational factors</i>	
Maintenance	Harder to maintain than train the new procedure With few surgeries of this type in a year, it will be difficult to maintain Nurses must be able to maintain the mixing of cement Training of newly arrived surgeons and nurses must be ensured Challenging if you have a fully inexperienced operation team

a) When patients with poor physiology break their hips.

TABLE 2 Team members' views and illustrative citations – leading to training needs.

Theme	Citations
Thoughts and challenges regarding the procedure	"It cannot be undone/the position [stem] cannot be changed, which makes you feel insecure"
Cement and its complications	"It is difficult to mix cement" "It is not enough to train how to mix it, we must also take into account how much time is available" ^a A surgeon suggested: "Reverse the thought. 5 min. is, in fact, a long time to help people not get stressed. Furthermore, show that plan B is not bad either, help talk the worst-case scenario down" A nurse continued: "We are already now in the process of turning cement into something extreme. It's just something you must learn" ^b
Thoughts about initial education and training	"A safety package" "It will be difficult to say when you are ready. Some will jump into it, whereas others will be stressed"
Educational culture and feedback	"We don't really have much of a learning culture around feedback from another specialist"
Maintenance of skills	"I don't know if it's so much the training in it; I think it's more like the maintaining"
How does the procedure change become successful?	"... if they don't get frustrated and stressed during the procedure, and you don't have a scared nurse, and you have minimised re-operations on the patient" "As with everything else, it should be used on the right patient [situations] and in the right hands"
Overall view on the aim of the interview study	"It is great that we are asked to participate. Usually, we are just told to do stuff" "We should do this before any big change in the department"

a) Inexperienced.

b) Experienced.

Proposals for training

All interviewees contributed and presented ideas and needs for individual and team skills training. The overall suggestions based on their discussions are presented in **Figure 1**. First, all team members should receive necessary data about the benefits for the patients of procedural change, potential complications and how to prevent these. Initiating a sense of meaning and motivation for the change was important. Second, the surgeon and the scrub nurse should be trained individually and as a team. Simulation was mentioned as a means to train practical, social and cognitive skills. The anaesthesia team was familiar with the procedure and confident in handling patients with cardiovascular complications, which is a known risk factor associated with cemented HA.

FIGURE 1 The circle of learning and training based on the interview study. The figure describes all the technical elements needed for safe procedure training. The themes in the middle depict non-technical barriers that are essential to address to achieve successful procedural change.



HA = hemiarthroplasty; OR = operation room.

The surgeons suggested training sessions with a surgeon experienced in performing a cemented total hip arthroplasty and supervision in their first experiences with cemented HA. They underlined the need to feel proficient in conducting the procedure. The surgeons were interested in how to maintain competence and how to train new team members. They stressed that a lack of maintenance might make them apprehensive about future procedures, leaving them less competent to ensure quality and patient safety.

The scrub nurses worried about how new residents or consultants would be introduced to this procedure. One surgeon framed the team members' overall needs as a "safety package," including training and a psychologically safe learning space. They accepted and recognised that some team members would likely need more training

than others and mentioned that a “speak up” culture exists regarding individual needs and sharing of concerns within the team.

Educational culture and feedback

The interviewees discussed the educational culture and whether you receive and provide feedback. Some mentioned a previous culture that tends to be lenient about daily procedures. As a senior surgeon, you rarely get feedback from peers, and it is not apparent how strong the need for feedback is. Typically, they learn from their mistakes and get specific feedback on what to do differently, but not necessarily on what goes well. They mentioned a changing culture in which surgeons have started to welcome and provide constructive feedback.

The surgeons are brought up to try to solve the problem themselves, and, with experience, they need less help. However, they call for help when they feel inexperienced, preferring a friendly, experienced supervisor.

Expectation alignment: "check-in", "cement time-out" and "check-out"

The team's future cooperation during the new procedure was discussed, and it was suggested to add new elements to the existing “check-in” and “check-out”, and introduce a "cement time-out", with the following content:

- "check-in": clearly communicate experience with cement and speak up about how to proceed
- "cement-time-out": align the team, focus on the cement procedure and the patient's status
- “check-out”: reflect on the procedure, i.e., ask: How did we prepare? Did it go as planned? A checklist of success criteria for the procedure was suggested here.

How do we change the procedure successfully?

The interviewees had several suggestions for how to achieve success. A successful change of procedure depends on achieved competence; it is all about having the right sense of how to mix the cement (scrub nurses) and how to introduce the stem (surgeons). A few of the surgeons were concerned about the higher risk of cardiovascular complications during surgery.

Roles and responsibilities must be clearly defined, especially who is expected to do what and when. They also mentioned that when they needed to learn and that they were motivated to train conducting the procedure to everyone's satisfaction. In essence, the change would be considered successful if the patient outcome was improved using this surgical procedure. The team members mentioned the importance of data collection in order to follow their progress. They also discussed the possibility of assessing the success rate at the individual level, supported by constructive professional feedback.

DISCUSSION

The study aimed to explore the teams' barriers and facilitators towards changing from an uncemented to a cemented HA and their suggestions about how to educate and train the team. We showed that using daily clinical work situations and simulation-based training, creating a sense of meaning and motivation and providing training opportunities, is essential. The challenges and training needs are centred around competence and educational culture.

Changes in practice are based on evidence, but we rarely consider an evidence-based approach to education and implementation [8]. We often neglect the need for proper training when it involves experienced staff, who, in this case, are, in fact, novices. This might slow down implementation and risk compromising the patient outcome. To achieve a smooth and safe change in practice, we found that the interviews provided valuable

insights about the OR team's needs in performing the new procedure and how this could qualify the implementation.

Interestingly, the interviewees commented on the possibility of training in the daily clinic so that surgeons and scrub nurses can become familiar with the cemented procedure by joining the team performing total alloplastic operations where cementation is performed routinely. This agrees with a paradigm shift in medical education towards workplace-based learning [9].

For surgeons, the steps needed to become an expert depend on the number of procedures they perform [10]. The team agreed that the number of procedures any surgeon needs to perform under supervision would depend on the individual.

Expert-level performance requires that performance gradually improves as the future expert remains cognitively engaged in improving the performance, in so-called "deliberate practice", rather than just performing the procedure on a routine level [11]. It requires targeted work to improve specific aspects of performance within a well-defined procedure, along with detailed and immediate feedback. The surgeons were concerned that there might not be sufficient cases to stay an expert when newcomers also needed training. The interviewees' focus on maintaining competence is noteworthy as training increases performance, and periods of non-training will impair performance due to the natural decay of learned skills over time [10]. The team insisted newcomers participate in the training package before performing the procedure. Existing processes, such as the Surgical Checklist, were expanded by adding a cement time-out [12], which is a promising tool for creating a focused, safe space for performing the cement procedure as a team.

In accordance with the literature about deliberate practice and workplace-based learning [9, 11], supervision and receiving feedback when conducting the new procedure were stressed. Receiving and giving feedback can occasionally feel like personal critique, and training in clinical situations might be necessary [13]. In the daily clinic, experts often work alone with less opportunity to ask or receive feedback from colleagues; a change of work schedule may be necessary to facilitate the provision of feedback.

A safe learning space is essential to ensure patient safety, i.e., to talk about mistakes in a blame-free manner. If a team member feels psychologically safe, they can be open about failures, ask for help, as the interviewees did, and receive and provide feedback [14, 15]. Some seniors did express a wish for continuous peer-to-peer feedback at their specialist level; others found it difficult and structurally impossible.

The importance of good teamwork for the team's ability to perform and to ensure patient safety is well described in the literature [16]. In our study, the team also focused on the importance of the team's focus on the common task, knowing exactly what to expect during the full procedure, including knowing everyone's task. Introducing a "cement time-out" was the teams' way of consolidating their work at the most challenging stage of the procedure and leaving room for questions. In addition, they mentioned that simulation could contribute to a common understanding and feeling of forming part of a team, which agrees with the literature [17-19].

Overall, the interviewees appreciated being asked about their experiences, expectations and training needs. They were grateful that the clinical management was attentive to their considerations, which was uncommon. They explained that this made them feel motivated to follow the recommendations.

If team members lack information about a change of procedure, negative myths about the importance of implementation may develop. In our study, the concept of time and the preservation of myths led to potential fear of the procedure and concerns about time. Knowledge is valuable as the surgeons and the nurses who know the procedure have no fear, whereas inexperienced nurses worry about mixing cement. This aligns with several descriptions of embodied learning and cognition, having a sense of "non-verbal" expertise in your hands [20].

Limitations

The relatively small sample may challenge the broader application of our findings. Furthermore, data were collected in one hospital only, which may influence the generalisability of our findings. However, we do not believe that the conditions at our department differ from those of other Danish hospitals in terms of structure and culture. The OR team, 15 interviewees, inspired each other to discuss barriers and ideas for training. Most were pleased to be heard, and the interviews may be interpreted as the first step of the implementation.

Conclusions

The study brings novel insights into the full OR team's personal experiences, expectations and knowledge about specific educational needs during the transition from uncemented to cemented HA, which may foster a more sustainable and safe practice. A safe training "package", including workplace-based learning and simulation, was seen as necessary, highlighting the importance of continuous maintenance of competence. A "cement-time-out" was proposed to assure safe and focused teamwork and accommodate the "fear of time". Our findings are relevant for departments introducing this procedural change and engaging in procedural change in general.

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Accepted 23 July 2024

Conflicts of interest Potential conflicts of interest have been declared. Disclosure forms provided by the authors are available with the article at ugeskriftet.dk/dmj

Acknowledgements The authors would like to acknowledge *Torben Beck* for all practical learning sessions and meetings with the group. *Kenneth Szkopek* for contributing to the study design, choice of prosthesis and effectuation, and *Klaus Nymark Andersen*, meetings with the group and support as head nurse of the department.

References can be found with the article at ugeskriftet.dk/dmj

Cite this as *Dan Med J* 2024;71(11):A02240143

doi 10.61409/A02240143

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Supplementary file <https://content.ugeskriftet.dk/sites/default/files/2024-07/a02240143-supplementary.pdf>

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