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Designing a nurse-delivered delirium bundle: what ICU staff, survivors and their families think

ABSTRACT

Background. Implementation of quality improvement interventions can be enhanced by exploring the perspectives of those who will deliver and receive them. We designed a non-pharmacological bundle for delirium management for a feasibility trial and we sought to obtain the views of Intensive Care Unit (ICU) staff, survivors and families on the barriers and facilitators to its implementation.

Objective: To determine the barriers and facilitators to a multi-component bundle for delirium management in critically ill patients comprising [1] education and family participation, [2] sedation minimisation and pain, agitation and delirium (PAD) protocol, [3] early mobilisation and [4] environmental interventions for sleep, orientation, communication and cognitive stimulation.

Methods: Nine focus group interviews with ICU staff (n=68) in 12 UK ICUs. Three focus group interviews with ICU survivors (n=12) and their family members (n=2). Interviews were digitally recorded, transcribed and thematically analysed using the Braun and Clarke framework.

Results: Overall, staff, survivors and their families agreed the bundle was acceptable. Facilitating factors for delivering the bundle were staff and relatives' education about potential benefits and encouraging family presence. Facilitating factors for sedation minimisation were evening ward rounds, using non-verbal pain scores and targeting sedation scores. Barriers identified by staff were inadequate resources, poor education, relatives' anxiety, safety concerns and ICU culture. Concerns were raised about patient confidentiality when displaying orientation materials and managing resources for early mobility. Survivors cited that flexible visiting and re-establishing normality were important factors; and staff workload, lack of awareness and poor communication were factors that needed to be considered prior to implementation.

Conclusion. Generally, the bundle was deemed acceptable and deliverable. However, like any complex intervention, component adaptations will be required depending on resources available to the ICU; in particular, involvement of pharmacists on the ward round and physiotherapists in mobilising intubated patients.

INTRODUCTION

Critically ill patients have an increased risk of developing delirium during their intensive care stay. Delirium is a common and devastating syndrome characterised by inattention and associated with increased mortality and morbidity^(1, 2, 3). Pharmacological therapies remain the popular choice for delirium management in United Kingdom (UK) Intensive Care Units (ICUs) despite the publication of recent studies and guidelines that indicate that there is insufficient evidence to support their use^(4, 5, 6). A multi-component non-pharmacological intervention may reduce incidence and severity of delirium by targeting known risk factors such as sensory deprivation, sleep deprivation and immobilisation in critically ill patients. Non-pharmacological interventions for delirium management have been effective in non-ICU populations but whether they are effective for critically ill patients has not been adequately researched^(7, 8).

We conducted a systematic review of studies evaluating non-pharmacological interventions for delirium management in critically ill patients to determine which interventions were most effective for reducing the incidence and/or duration of delirium⁽⁹⁾. Findings indicated a number of effective interventions, some that could be delivered singly or in combination^(11 – 19). These findings were presented to a panel of international, multidisciplinary delirium experts for agreement at the 2016 Intensive Care Society State of the Art meeting in London. Following discussion with the panel, a delirium bundle based on best evidence was designed to be tested in a feasibility study. The bundle comprised four components [1] education and family participation, [2] sedation minimisation and

Pain Agitation and Delirium (PAD) protocol, [3] early mobilisation and [4] environmental interventions.

Translating knowledge to practice for healthcare professionals can be more successful if it is informed by an assessment of the barriers and facilitators⁽²⁰⁾. Therefore, the aim of this study was to elicit the perspectives of ICU staff, survivors and families about the barriers and facilitators to delivering and receiving this delirium bundle that would inform design, delivery and implementation.

METHODS AND MATERIALS

Research approach

The research approach was guided by the Medical Research Council framework for the development of complex interventions⁽²¹⁾ and a systematic review of key factors affecting intervention implementation^[22]. This approach enabled us to examine deliverability and acceptability of the components in the bundle using focus group interviews. We elicited the perspectives of ICU staff, survivors and their families using focus group interviews conducted between July and September 2016.

Semi-structured questions in the interview guide were framed around the key findings from Durlak's systematic review^[22] (see appendix 1 for interview schedule). The study was approved by an NHS research ethics committee (OREC/16/EM/0208). The standards for reporting qualitative research (SRQR) were applied⁽²³⁾.

Setting

Staff interviews took place in 12 NHS adult general ICUs in England, Scotland, Wales and Northern Ireland. We used a sampling matrix to ensure inclusion of units from all four devolved nations of the UK and staff with a range of experience from less than one year to ten years and over. ICUs ranged in size from seven beds to 52 beds with a range of specialties including medical, surgical, trauma and burns. Interviews with ICU survivors and their families were conducted face to face at ICUsteps

group meetings in England and Northern Ireland and online using Skype technology with each participant in their own home ⁽²⁴⁾.

Participant Recruitment

ICU staff were recruited from the membership of the British Association of Critical Care Nurses (BACCN): the professional organisation for critical care nurses in the UK that has representation in the majority of UK ICUs. The ethos of the association promotes engagement in research for patient benefit, which is why I chose this method. Approval was granted by BACCN to post a study advertisement on the website and in the newsletter. Interested members discussed potential participation with staff in their ICUs; received approval from the ICU managers; and recruited staff to attend focus group interviews. Interviews took place in a hospital or university meeting room.

Inclusion criteria were staff with more than 6 months experience working in critical care and purposeful sampling method was encouraged to ensure a range of professions and experience within the focus group (Table 1).

ICU survivors and families were recruited from ICUsteps, a charity that supports survivors of critical illness and their families. Approval was received by ICUsteps to circulate study information via the ICUsteps newsletter and website: potential participants then contacted an investigator (LB) directly. Inclusion criteria were that ICU survivors had to have been cared for in ICU for greater than 48 hours.

Data Collection

Focus groups interviews were approximately 60 - 90 minutes in length and conducted by LB with experience in critical care nursing and research. The interview was preceded by a PowerPoint presentation of the multicomponent delirium bundle to initiate the discussion. Interviews were recorded using a WS-831 Digital Voice Recorder (Olympus Imaging Corp, Tokyo, Japan) and

transcribed verbatim by an independent transcriber. Interviews continued until data saturation was obtained which was judged by no new data arising in the interviews ⁽²⁵⁾.

Data Analysis

The transcripts were reviewed by the interviewer (LB) and compared with the voice recordings and the handwritten notes taken during discussions to reduce the risk of errors and missing information.

The corrected transcripts were thematically analysed using the Braun and Clarke thematic analysis framework to identify barriers and facilitators to the multicomponent bundle ⁽²⁶⁾.

To enhance confirmability of the results a random sample of 15% of the transcripts were independently analysed by a second investigator (JMG). Interpretations were discussed until consensus was reached to reduce the influence of personal characteristics on interpretation and bias.

RESULTS

Results are presented separately for (1) staff and (2) survivors and family members outlining generic (to the interventions as a whole) and specific (for each component of the intervention) barriers and facilitators to delivery and acceptability of the bundle. Quotes from transcripts have been used to support the themes arising for each participant group.

Twelve focus group interviews were conducted, nine involved staff (n = 68) and three involving ICU survivors (n = 12) and family members (n = 2). Tables 1 and 2 present a summary of participant characteristics.

ICU staff perceptions of the multicomponent bundle

Acceptability of the intervention

Staff from all focus groups felt that this multicomponent intervention comprising education, sedation minimisation, early physical therapy and environmental interventions was feasible and acceptable to implement for delirium management in critically ill patients. Concerns were expressed about the feasibility of pharmacy involvement on the ward round and early physical activity of mechanically ventilated patients without an improvement in current staffing levels.

"I think there's lots of elements that we are already working on and we can definitely do some things better." [FG3, ICU nurse, M].

"there are limitations; chairs and staff, coordinating time." [FG11, ICU nurse, F]. [speaking about early physical activity].

There were two generic factors that staff perceived would facilitate their use of this bundle:

1. Family presence was perceived as creating a sense of familiarity and safety for patients. Staff felt that families were an underutilised resource in ICU and could be used to assist with communication, orientation, personalising music selection and personal care if appropriate training and support was available. Family presence could be encouraged by facilitating more flexible visiting hours.

"I've seen people who I thought were tipping into delirium actually end it in a much shorter period because of the presence of familiarity and safety around them" [FG8, Clinical Psychologist, F]

2. Education for staff about delirium in ICU was deemed important for challenging existing cultures of deep sedation and excessive noise at night and would improve staff engagement with the delivery of the interventions. They suggested that education programmes should include some formal feedback from patients about their experiences in the ICU. Additionally, staff reported that education for relatives might help address their anxiety, although timing in the patient's illness trajectory would be crucial to enable retention of information.

Specifically focusing on individual components of the bundle, factors that would facilitate the orientation and communication component were use of picture boards and photographs. Factors that would facilitate the sedation minimisation component, particularly for less experienced staff, were protocols, guidelines, targeted sedation, non-verbal pain scores and identifying suitable patients for a sedation break in an evening ward round on the previous day. Use of a Richmond Agitation Sedation Score (RASS) for monitoring sedation scores is standard practice in ICU however targeting a specific score for example, 0 alert and orientated, is not part of this practice but participants believed this helped reduce the amount of sedation administered overall. The use of a pain tool such as Critical Care Pain Observation Tool (CPOT) ⁽²⁷⁾ for non-verbal patients is not standard practice however staff participants reported that the use of this tool facilitated sedation minimisation by avoiding the need for higher sedation due to better controlled pain. Staff reported that communication training and availability of tools would be useful for helping to meet patients' pain and care needs.

There were five generic barriers perceived by staff as barriers to successful delivery of the bundle:

1. Staff cited limited resources, in terms of personnel, equipment and space, which could be further exacerbated by the need to facilitate staff breaks and lengthy patient transfers out of ICU. A busy workload was a barrier to the delivery of the bundle. Caring for a critically unstable patient could negatively influence the care of other patients under their supervision and interventions like sedation interruptions or extubation might be delayed. Staff reported that assessments were completed but not formally documented due to lack of time. Staff felt that there was a role for support staff such as nursing auxiliaries and volunteers to sit with patients when they are agitated to reduce staff workload. Damaged or missing seating and equipment blocking corridors were additional barriers to early mobilisation.

2. Lack of in-service education about the effects of sedation and the negative impact of delirium was cited as a barrier. Interviewed staff reported having a poor knowledge of delirium management policies and a general perception among staff that sedated patients lacked awareness of noise and care activities. The majority of staff interviewed were not aware of recommendations for non-verbal pain scores and daily screening for delirium and compliance with delirium screening was poor across all of the ICUs included in this study.

‘Does it matter, if someone is heavily sedated and they come to do that, are they aware to a certain level?’ [FG12, Physiotherapist, M]. [speaking about washing patient in the middle of the night].

‘There is a tendency for staff to leave radios on in sedated patients’ rooms.’ [FG11, Nurse, F].

3. Anxious relatives often created a barrier to the delivery of interventions in two ways; they asked excessive questions that increased staff workload and created a chaotic environment for patients. Staff felt that this was due to fear and lack of control and they discussed how flexible visiting (can visit at any time but advised to avoid busy times or night-time) rather than open visiting (open 24 hours) could be beneficial to patients and families as they needed permission to go home and often felt guilty for leaving.

4. Patient safety concerns especially during busy times was felt to be a barrier to the delivery of the bundle. Staff reported using higher doses of sedation to maintain patient safety especially when covering for staff breaks, transfers or patient care. Additionally, they reported that weaning patients off sedation was often delayed as it was easier to get patient care activities, administration of medications and documentation completed when looking after a sedated patient.

5. A further barrier cited was a difference in cultural perceptions. Staff discussed how families in other countries provided food and personal care for patients and they felt this culture shift had not occurred in the UK. Historically, deep sedation was required for the management of an intubated,

ventilated patient in the ICU and as a result, a culture of deep sedation emerged which often meant there was a reluctance to mobilise these patients for fear of dislodging their ET tubes.

'I think if they've got the mask or they have got a [tracheostomy], you slightly do push them further than you would if they had an ET tube.' [FG3, ICU nurse, F].

In relation to barriers regarding specific components, staff felt the whiteboard might raise concerns about confidentiality by displaying patients' information; especially in small ICUs where this information was more readily seen. Regarding early mobilisation, physiotherapists felt they might be restricted by competing priorities: chest physiotherapy was often seen as a priority over early mobilisation, which might restrict their time to deliver this intervention.

ICU survivors and their families' perceptions of the multicomponent bundle

There were two generic factors that survivors and their relatives perceived would facilitate their use of this bundle:

1. Re-establishing normality was seen as a facilitator to the delivery of a multicomponent intervention. Survivors reported that they felt being able to mobilise out of bed, listen to music and get their hair washed gave them a sense of normality and improvement and this helped them engage with the interventions as they perceived them as beneficial.

"But I think just as importantly, getting out of bed, you're actually thinking, great, I'm out of ICU in the next couple of days" [FG10, ICU survivor, M].

2. Flexible visiting for relatives was a facilitator to communication, family participation, orientation and early mobilisation. Relatives reported that a flexible visiting policy could allow them to assist with care, orientation, mobilising, choosing music for loved ones and bringing in communication materials. Flexible visiting also allowed relatives to manage visiting more effectively so everyone was not arriving at the same time and tiring the patient.

211 Specifically focusing on individual components of the bundle, providing an escape from the loud,
212 hostile environment by using earplugs, music and headphones were perceived as helping to facilitate
213 sleep and relaxation for survivors. Importantly, survivors and their relatives felt it was essential to
214 give patients the choice of using these devices as they may not suit everybody. Additionally, relatives
215 welcomed the communication bundle and made useful suggestions such as having a dedicated box
216 with communication materials that was easily accessible to staff and relatives.

217 There were three generic factors that survivors and their relatives perceived as barriers to the
218 delivery of this bundle:

219 1. Relatives felt that low staff numbers could be a barrier to the delivery of the bundle as staff may
220 not have the time required to deliver the interventions on top of a busy workload.

221 2. ICU survivors perceived that staff lacked awareness and understanding about patients
222 experiences under sedation and were not aware that patients were often privy to their personal
223 conversations. Survivors also felt staff did not understand their difficulties retaining information and
224 as a result, their need for constant reorientation. Relatives suspected this lack of awareness might
225 contribute to staff not engaging with the bundle.

226 *“They would come next to your bed and speak to one another but they wouldn’t engage the*
227 *patient” [FG 10, ICU survivors, F].*

228 3. Intubation and upper limb weakness can restrict a patients’ ability to communicate in ICU.
229 Difficulty communicating was perceived as a barrier to participation in many components of the
230 bundle as survivors felt physically unable to participate or quickly became frustrated if staff could
231 not understand them. One participant reported that there was ‘no way to communicate because
232 [he] couldn’t even move a finger and even if [he] could there wasn’t a fingerboard” [FG10, ICU
233 survivor, M]. Survivors and relatives considered whiteboards helpful for communication and
234 orientation and when questioned they had no confidentiality concerns.

In relation to barriers concerning specific components, fear was a barrier to family participation as relatives were cautious that they might cause harm or damage to the patient. Regarding early mobilisation, survivors felt that limb weakness often limited their ability to participate. Survivors reported significant muscle wastage during their ICU stay and many were shocked at the speed at which muscle strength deteriorated. They felt they needed to rely heavily on staff to support them and help them back into bed.

DISCUSSION

This study found that a multicomponent delirium bundle was acceptable to survivors and families and feasible to deliver in the ICU by staff with the exception of pharmacy involvement on the ward round and early mobilisation of patients with endotracheal tubes. The most important facilitators perceived by staff for delivering the intervention were the provision of additional supportive staff, increased family engagement and presence and more in-service education about sedation and its effects. Indeed, all participant groups recognised family presence as a facilitator and lack of education and awareness, lack of staff and communication as barriers.

Studies have reported high levels of anxiety, depression and Post Traumatic Stress Disorder (PTSD) in family members of ICU patients ^(28, 29). Family members' anxiety can be reduced by providing the knowledge and tools for them to participate in care giving ⁽³⁰⁾. A survey by Garrouset-Orgeas (2010) found that 96% of families' favoured participation in care and educating family members to assist in delivery of interventions would help relieve some of the burden for staff ⁽³¹⁾. In our study, groups suggested ways in which families could participate such as assisting with orientation, communication and aspects of personal care.

To ensure effective implementation of the bundle in practice, additional organisational resources would be required. There is a need to address staff support in the ICU to deliver early mobility to all patients and during delivery of sedation interruption (SI) especially for agitated patients.

Surprisingly, staff reported that sedated patients were often treated differently to awake patients

and staff believed there was a lack of knowledge about levels of awareness amongst sedated patients. Gesin et al (2012) found that an education programme on delirium improved nurses' knowledge of delirium and their understanding about why it is important to recognise delirium so a similar delirium education programme for staff would address knowledge deficits that exist and help change the culture of excessive noise and deep sedation ⁽³²⁾. A consensus meeting in 2014 outlined safety considerations that should be reviewed prior to mobilisation of adult, mechanically ventilated patients and these should be incorporated into a protocol with a non-verbal pain tool and a daily care plan with an area for the evening ward round to plan sedation breaks for the next day ^(27, 33, 34). Improving communication was a major priority for all participant groups and therefore training is required and provision of appropriate tools shown to improve communication between nurses and patients in ICU will need to be considered in the bundle ⁽³⁵⁾. These are simple, patient-centred realistic facilitators that could enhance delirium management in the ICU with no additional organisational cost.

Interestingly, ICU staff and survivors had divergent views on the confidentiality of whiteboards with information displayed about the patient to enhance communication. Staff felt that this could be a confidentiality issue while in contrast, survivors had no concerns about the information being displayed and felt it would be very useful. Therefore, the whiteboard component would need to be considered for individual ICUs and staff may need to contemplate local adaptations to ensure privacy of this information.

The available literature on barriers and facilitators to non-pharmacological bundles is limited. A study of implementation of the awakening and breathing coordination, delirium monitoring and early mobility bundle (ABCDE) reported similar findings to our study with education identified as an important facilitator and knowledge deficits, workload concerns and lack of communication reported as common barriers ⁽³⁶⁾. In contrast to our study, this study identified the strength and quality of the evidence base for the bundle as a facilitator and this was not highlighted in our

interviews⁽³⁶⁾. In addition, the importance of family presence as a facilitator was agreed in all participant groups and has been emphasised previously in other studies^(37, 38).

Strengths and limitations of the study

A strength of this study was that we recruited ICU survivors and their families from different geographical locations in the UK and represented a range of admission types with good experience of the interventions discussed. Tape-recording the interviews, multiple coding during analysis and co-author checks also enhanced the rigour of this study.

A limitation of this study was that high levels of sedation, disorientation and confusion during the survivors' ICU stay might have diminished patients' memories and views of pain, agitation and delirium management. Participants self-selected for this study and this may have resulted in a biased sample, as participants with particularly strong opinions may be more likely to have volunteered. There were inherent difficulties in recruiting ICU survivors and in particular, their family members to participate in this study likely due to the burden of supporting the recovery and cognitive and functional impairments that present as part of the typical illness trajectory post ICU. This is not unusual in ICU research and has previously been reported as very challenging⁽³⁹⁾.

CONCLUSION

This bundle of non-pharmacological interventions may present a useful and relatively inexpensive approach to delirium management in critically ill patients. The four components are deemed feasible and acceptable to staff, ICU survivors and their families. However, like any complex intervention there will need to be adaptations made depending on the resources available to the particular ICU, especially regarding pharmacy involvement on the ward round and early mobilisation of patients with endotracheal tubes. This approach is paramount to defining an intervention and has helped shape this bundle, which is now being taken forward to test in a feasibility study.

Additional files

309 Additional file 1: Table 1: Characteristics of staff participants

310 Additional file 2: Table 2: Characteristics of ICU survivors and relative participants

311 Additional file 3: Standards for Reporting Qualitative Research (SRQR) checklist

312 Additional file 4: Appendix 1: Focus group interview topic guide.

313 **Keywords**

314 Delirium, Focus groups, Non-pharmacological, Perceptions.

315 **Abbreviations**

316 Intensive Care Unit (ICU). British Association of Critical Care Nurses (BACCN). Richmond Agitation

317 Sedation Score (RASS). Sedation interruption (SI). Critical Care Pain Observation Tool (CPOT).

318 Awakening, Breathing Coordination, Delirium management and Early mobilisation (ABCDE).

319 **Conflicts of interest**

320 LB has attended study days sponsored by Orion pharmaceuticals.

321 **Authors' contributions**

322 LB collected data, analysed the data, interpreted the data and wrote the manuscript. JM analysed

323 and interpreted 15% of the transcripts. BB, DM and MC advised on data analysis and BB and JM

324 provided critical input into the manuscript writing and completion. All authors approved the final

325 version of the paper and are entitled to authorship as listed authors.

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