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Review Article

Gaps in pain, agitation and delirium management in intensive care: Outputs from a nurse workshop

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ABSTRACT

Significant improvements in our understanding of pain, agitation, and delirium management within the Intensive Care Unit have been made in recent years. International guidelines and implementation bundles have become more evidence-based, patient-centred, and provide clear recommendations on the best-practice management of critically ill patients.

However, the intensive care community has highlighted the need for higher-order evidence in several areas of pain, agitation and delirium research and studies suggest that a significant number of intensive care patients still receive outdated treatment as a consequence of inadequate guideline implementation. Where do the gaps exist in pain, agitation and delirium management, what are the barriers to guideline implementation and how can these problems be addressed to ensure patients receive optimised care?

As an international professional consensus exercise, a panel of seven European intensive care nurses convened to discuss how to address these questions and establish how the provision of pain, agitation and delirium management can be improved in the intensive care unit.

Implications for Clinical Practice

- During the panel workshop and subsequent literature review we identified substantial evidence to suggest that many aspects of the pain, agitation, and delirium management guidelines are not being implemented by a significant number of ICUs.
- Incomplete and inconsistent implementation of guidelines and heterogeneity of care appears to be a universal problem and more needs to be done to promote consistency of care.
- We have proposed a series of interventions to improve awareness and understanding of the guidelines as well as to encourage collaboration and a multidisciplinary approach to ICU care.

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Consensus exercise overview

The evidence cited within this publication has been established from two sources, an international Intensive care unit (ICU) nurse workshop and a subsequent literature review.

ICU nurse workshop

Nurses from seven european union countries were invited to an 'Improving outcomes in ICU sedation' Advisory Workshop on 06 February 2017 at the Hilton hotel, Copenhagen Airport, which was Chaired by Paola Massarotto, an ICU nurse from University Hospital Zurich, Switzerland. The invited nurses were chosen based on their publishing history in the therapy area, those actively involved in appropriate nurse associations and those who had spoken at congresses on relevant topics.

The participants of the workshop were nurses were aware that they would be discussing details of their current practice and were provided with three scientific publications (Egerod et al., 2013; Trogrlić et al., 2015; Vincent et al., 2016) covering the topics of the advisory workshop for reference purposes.

Name	Location	Role
Paola Massarotto (Chair)	University Hospital Zurich, Switzerland	Past President of the board of SGI
Andrea Berry	Leeds General Infirmary, United Kingdom	Lead nurse/manager
Karen Fritz	Vienna General Hospital, Austria	Head of nursing department
Carsten Hermes	Self-employed nurse	Head ICU nurse
Thomas Kjellgren	Sahlgrenska University Hospital East, Gothenburg, Sweden	ICU instructor nurse
Alessandra Negro	San Raffaele Hospital, Milan, Italy	ICU nurse
Maria Acevedo-Nuevo	Hospital Puerta Hierro, Madrid, Spain	Critical care (ICU) nurse

The objectives of the meeting were to compare and understand current pain, agitation and deliruim (PAD) management practices in each country and to then establish which aspects of the recent guidelines remain to be implemented, the barriers to that implementation, and how patient management could be improved. The

Literature review

During the nurse workshop, a series of key topics were identified for discussion. A literature review was performed to address these questions and place the nurses' insights and experiences within the context of the broader published literature.

Publication identification was performed using keyword searches as outlined in the table below. These were combined using Boolean operators [OR] or [AND] and results were limited to manuscripts published in the last 20 years (since 1997/01/01).

The below table outlines the questions we sought to address to build upon the insights gained at the workshop. In some instances, a series of search criteria were utilised to address a broad question such as the consequences of pain, agitation and delirium on patients within the ICU.

Question	Search criteria	No. returned manuscripts	No. selected manuscripts
What impact do pain, agitation and delirium have on patients in the ICU?	[Pain] AND [ICU] AND [management]	351	11
	[Agitation OR sedation] AND [ICU] AND [management]	397	18
	[Delirium] AND [ICU] AND [management]	199	18
	[Delirium] AND [ICU OR critical care] AND [hospital stay OR cognitive impairment OR mortality]	839	14
What are the effects of non-pharmacological interventions in the ICU on the prevention of delirium?	[ICU OR intensive care] AND [non-pharmacological] AND [delirium]	36	5
Is early mobilisation effectively used in the ICU?	[ICU OR intensive care] AND [early mobilisation OR early mobilization]	501	12
What are the benefits of an MDT approach to ICU care?	[ICU OR intensive care OR critical care] AND [ward OR rounds] AND [pharmacist]	133	5
	[ICU] AND [multidisciplinary] AND [family]	64	3
	[ICU OR intensive care] AND [collaboration OR clinical roles] AND [nurse]	316	5
What are the benefits of interprofessional education?	[Interprofessional education OR interprofessional learning OR interprofessional collaboration] AND [healthcare OR medical]	972	3

Table 1
Commonly used ICU guidelines in seven European countries as reported by individual attendees at the ICU nurse workshop. List is based on the personal knowledge and experience of the workshop panel and so may not be exhaustive.

Country	Preferred guidelines
Austria	• German S3-guidelines (DAS-Taskforce et al., 2015) • Local guidelines e.g. local hospital guidelines
Germany	• ABCDEF bundle (Barnes-Daly et al., 2017) • German S3-guidelines (DAS-Taskforce et al., 2015) • Local guidelines e.g. local hospital guidelines • PAD management guidelines (Barr et al., 2013)
Italy	• ABCDEF bundle (Barnes-Daly et al., 2017) • PAD management guidelines (Barr et al., 2013)
Spain	• Incomplete/partial application of the ABCDEF bundle (Barnes-Daly et al., 2017) • PAD management guidelines (Barr et al., 2013) • Pan-American guidelines (Celis-Rodríguez et al., 2013) • Spanish guidelines (La Sociedad Española de Medicina Intensiva, 2011)
Sweden	• Local guidelines e.g. local hospital guidelines
Switzerland (regional language dependent)	• ABCDEF bundle (Barnes-Daly et al., 2017) • French guidelines (Sauder et al., 2008) • German S3-guidelines (DAS-Taskforce et al., 2015) • NICE guidelines (National Institute for Health and Clinical Excellence, 2010, 2014) • PAD management guidelines (Barr et al., 2013)
United Kingdom	• Intensive Care Society guidelines (Intensive Care Society, 2016) • NICE guidelines (National Institute for Health and Clinical Excellence, 2010, 2014)

Key references highlighted by identified articles were also assessed for inclusion to ensure no pertinent data was excluded. All articles were manually scanned for relevance to the topic and selected based on scientific rigour (e.g. preference for randomised controlled trials over retrospective analyses, case reports etc.). All authors reviewed the list of proposed publications and approved them for inclusion.

Standards of care in the ICU: Could we do better?

Significant advances in the physical and psychological management of ICU patients have culminated in the development of evidence-based guidelines for a range of topics including the management of pain, agitation, delirium (PAD) in critically ill patients (Barr et al., 2013; Celis-Rodríguez et al., 2013; Shehabi et al., 2013a; DAS-Taskforce et al., 2015; Vincent et al., 2016).

The avoidance of deep sedation during ICU clinical practice was recommended in recent guideline updates (Barr et al., 2013; DAS-Taskforce et al., 2015). This represents a significant change from the historical management of ICU patients (Barr et al., 2013; DAS-Taskforce et al., 2015). In fact, the recommendation to avoid deep sedation in mechanically ventilated patients without a specific indication and without daily attempts to lighten sedation was one of the Critical Care Societies Collaborative's Top five recommendations for higher quality and lower cost care (Halpern et al., 2014).

Maintaining adult ICU patients in light sedation (Richmond Agitation-Sedation Score (RASS) of 0 to −1 in the German S3-guidelines (DAS-Taskforce et al., 2015) and −1 to −2 in the PAD guidelines (Barr et al., 2013), unless otherwise indicated, is associated with improved survival, shorter duration of mechanical ventilation and a reduced length of stay in the ICU (Barr et al., 2013; Balzer et al., 2015). Furthermore, in a study of nursing workload in ICU patients, while standard indices (TISS-10, TISS-28, NEMS) did not reflect the higher daily workload associated with patients with delirium and agitation in general, significantly higher workload scores were observed in deeply sedated and comatose patients but not in lightly sedated patients (Guenther et al., 2016).

Recent guidelines state that the first step in managing ICU patients is to detect and control pain (Barr et al., 2013; Vincent et al., 2016). Unrelieved pain in the ICU can have long-term consequences including increased incidence of chronic pain and post-traumatic stress disorder (Schelling et al., 1998; Granja et al., 2008; Battle et al., 2013). Despite these risks, many patients within the ICU still experience significant pain (Chanques et al., 2007; Gélinas, 2007; Payen et al., 2007; Yamashita et al., 2017).

Delirium affects a significant proportion of ICU patients and has been associated with increased mortality, prolonged ICU and hospital length of stay and post-ICU cognitive impairment (Ely et al., 2001; Ely et al., 2004; Milbrandt et al., 2004; Pisani et al., 2009; Girard et al., 2010; Shehabi et al., 2010). Early deep sedation has been linked to the development of delirium in ICU patients (Shehabi et al., 2013b; Vincent et al., 2016) highlighting the need for light sedation where possible and to regularly screen for PAD (Barr et al., 2013; DAS-Taskforce et al., 2015).

ICU-related conditions such as delirium and ICU-associated weakness (ICU-AW) can significantly affect patient outcomes (Brummel et al., 2014; Girard et al., 2010; TEAM Study Investigators et al., 2015). Interventions, such as the use of light sedation, validated assessment tools and early mobilisation reduce the risk of developing them, but implementation remains variable and solutions are needed (Shehabi et al., 2013b; TEAM Study Investigators et al., 2015; Yassin et al., 2015).

Practical guidelines are now available, but have significant changes been made to clinical practice? The panel workshop and subsequent literature review identified several inadequacies in patient care: (1) inadequate guideline use, (2) overuse of deep sedation, (3) irregular patient assessments within the ICU, (4) insufficient patient mobilisation.

Gaps in guideline use

In 2013, the Society of Critical Care Medicine (SCCM) published updated PAD management guidelines (Barr et al., 2013). In a 2014 survey of SCCM members, 90% of the 635 respondents were aware of the guidelines and most had implemented at least some of the recommendations (Mo et al., 2017). However, this survey of predominantly US-based (84%) SCCM members may not be representative of ICUs around the world. A recent German survey of 559 ICU clinicians indicated that less than half of patients were screened for delirium following suspicious behaviour (Nydahl et al., 2017a). The panel workshop identified a variety of international and local ICU guidelines that are currently being used within their respective country (Table 1).

Creation of local guidelines does not appear to be a guarantee of implementation. Following publication of the updated German S3-guidelines for PAD management (DAS-Taskforce et al., 2015), a survey of senior German anaesthetists revealed that although 90% of clinics were aware of the guidelines, just 40% had incorporated them into their standard operating procedures (Saller et al., 2016). Furthermore, in a recent online survey of 559 ICU clinicians in German-speaking countries, just 22% reported assessing delirium three times a day as recommended. Meanwhile, nearly 45% reported only screening when suspicious behaviour was observed and just 57% used a validated assessment tool (Nydahl et al., 2017a).

A number of interventions improve ICU patient outcomes including spontaneous awakening trials and early mobilisation, however, a bundled approach to implementation is believed to be more effective (Miller et al., 2015). Indeed, implementation of guideline-based care via one such intervention bundle in seven US hospitals resulted in significant improvements in ICU patient morbidity and mortality (Barnes-Daly et al., 2017). The Awakening and Breathing Coordination, Delirium monitoring/management and Early exercise/mobility (ABCDE) bundle was developed in 2010 to standardise ICU care but, implementation remains limited (Balas et al., 2013). In a survey of 212 ICU staff from 51 US hospitals, only 12% had implemented the entire bundle (Miller et al., 2015). Issues with bundle implementation appear to be widespread. Only 42% of surveyed Italian ICU nurses were aware of the ABCDE bundle and although 67% believed it could improve patient outcomes just 34% considered it applicable to their ICU (Pinto and Biancofiore, 2016).

Insights from the panel workshop suggest that guideline preferences varied widely. Of note was the lack of local education and guideline translations representing a clear barrier to implementation and harmonisation of care.

Overuse of deep sedation

ICU guideline implementation remains suboptimal and a significant number of patients receive care that is contrary to the latest guidelines (Barr et al., 2013; Shehabi et al., 2013b; TEAM Study Investigators et al., 2015). This includes the use of deep sedation, which is associated with a range of potential problems including delirium, permanent cognitive decline, prolonged mechanical ventilation/weaning, an increased risk of pneumonia, respiratory depression, myocardial depression and haemodynamic instability, peripheral muscle weakness, ICU-acquired weakness and increased risk of thrombophlebitis (Vincent et al., 2016).

Variation in sedation-related guideline use and clinical practice is prevalent at the country, regional, hospital and even individual level (Theuerkauf and Guenther, 2014). In a survey of 157 UK ICUs, 87% of respondents used scores to assess patient sedation, but only 59% used sedation guidelines. Furthermore, only 42% employed daily sedation targets for patients (Yassin et al., 2015). Despite the benefits of light sedation, many patients continue to be heavily sedated (Shehabi et al., 2013b; TEAM Study Investigators et al., 2015). In a multicentre, prospective, longitudinal cohort study in 11 Malaysian hospitals, 71% (182/257) of patients at first assessment were in deep sedation (RASS −3 to −5) and 61% remained in deep sedation after 48 hours (Shehabi et al., 2013b). Similar results were observed in a prospective cohort study of 12 ICUs in Australia and New Zealand where 64% (124/192) of patients were deeply sedated during their time in the ICU (TEAM Study Investigators et al., 2015). Clearly, more needs to be done to promote guideline-based sedation recommendations.

Table 2
Assessment tools commonly used within the ICUs of seven European countries as identified by individual attendees at the ICU nurse workshop. BPS: Behavioural Pain Scale, BPS-NI: Behavioural Pain Scale – non-intubated, CAM-ICU: Confusion Assessment Method for the ICU, CPOT: Critical Care Pain Observational Tool, ESCID: Behavioural Indicators of Pain Scale (Escala de Conductas Indicadoras de Dolor), ICDSC: Intensive Care Delirium Screening Checklist, NRS: Numeric Rating Scale, NuDESC: Nursing Delirium Screening Scale, RASS: Richmond Agitation Sedation Scale, SAS: Sedation Agitation Scale, VAS: Visual Analog Scale, ZOPA: Zurich Observation Pain Assessment.

	PAIN	SEDATION/ AGITATION	DELIRIUM
Austria	BPS	RASS	CAM-ICU; ICDSC; NuDESC
Germany	BPS; BPS-NI; NRS; VAS	RASS	CAM-ICU; ICDSC; NuDESC
Italy	BPS; CPOT	RASS	CAM-ICU; ICDSC
Spain	ESCID; NRS	RASS	CAM-ICU
Sweden	CPOT; VAS	RASS	CAM-ICU; NuDESC
Switzerland	CPOT; NRS; VAS; ZOPA	RASS; SAS	CAM-ICU; ICDSC
United Kingdom	BPS	RASS	CAM-ICU

Irregular assessment in the ICU

Regardless of the sedation level patients receive, it is critical that patients are regularly assessed for PAD (Barr et al., 2013; Celis-Rodríguez et al., 2013; DAS-Taskforce et al., 2015; Vincent et al., 2016). However, assessment use frequently remains variable and sporadic (Sneyers et al., 2014; Pinto and Biancofiore, 2016; Sneyers et al., 2017).

Pain management within the ICU appears to be neglected. Only 12% of respondents to a survey of physicians and nurses in every Belgian ICU used validated scales, such as the Behavioural Pain Scale (BPS) or the Critical Care Pain Observational Tool, in patients unable to self-report. Over 80% reported using physiological parameters or behaviours as alternative measures for pain despite the former being unreliable surrogates (Sneyers et al., 2014). Encouragingly, the use of sedation scales may be closer to guideline-based recommendations. A follow-up survey in Belgium revealed sedation scales were used ≥3 times per day by 85% of clinicians (Sneyers et al., 2017). Regional variation in their use again appears to be prevalent though. In a survey of Italian ICU nurses, 80% of respondents found the RASS and Confusion Assessment Method for the ICU (CAM-ICU) scales easily understandable, yet 48% did not use them (Pinto and Biancofiore, 2016). Meanwhile, only 31% of 212 US ICU representatives performed daily delirium assessments in ≥75% of ventilated patients (Miller et al., 2015). Similar results were seen in the United kingdom (UK) where only 43% of respondents assessed patients for delirium and just 17% utilised a validated assessment tool (Yassin et al., 2015). Underutilisation of assessment tools signals a need for additional healthcare professional (HCP) education and training. A series of qualitative studies support this suggesting that delirium is considered a low priority by ICU physicians and nurses, and many lack confidence in its assessment and management (Balas et al., 2013; Oxenbøll-Colet et al., 2016; Palacios-Ceña et al., 2016; Zamoscik et al., 2017).

As with guideline implementation, regional and local variation in assessment scale preference may affect harmonisation of care. Panel workshop attendees believed that most ICU nurses were familiar with some of the validated tools, but their use varied widely even down to differences between individuals within an ICU (Table 2).

While insufficient education was cited as a contributor to variations in assessment, some attendees felt that nurses could also be a barrier. Nurse experience, openness to change and levels

of motivation all influence nurse behaviour. Many on the panel also believed that assessment tools were considered time consuming and difficult to incorporate into nurses' workload. While this concern has been observed (Ramoo et al., 2017), it is not universal (Sneyers et al., 2014). In fact, a structured programme within a Dutch ICU overcame nurse concerns regarding time demands and increased the frequency of CAM-ICU assessment to 95% of unsedated patients per nursing shift (Riekerk et al., 2009).

Patient mobility problems

Non-pharmacological interventions, including early mobilisation (defined as any active exercise during days two to five in the ICU where a ventilated patient could assist in the activity using their own muscle strength and control (TEAM Study Investigators et al., 2015)), optimisation of environmental conditions and appropriate cognitive stimulation, can reduce the risk of delirium (Colombo et al., 2012; Pandharipande et al., 2017; Patel et al., 2014; Zoremba, 2017).

Despite the benefits of early mobilisation and its inclusion in the ABCDE bundle and PAD guidelines (Balas et al., 2013; Barr et al., 2013), it continues to be underutilised. Early mobility was a specific goal for 65% of respondents to a survey in the United states (US), but just 39% reported that mechanically ventilated patients routinely received active exercises within the first 48–72 hours (Miller et al., 2015). Insufficient use of early mobilisation appears to be a common problem. In 951 ICUs across four countries, early mobilisation was used in only 40%, 59%, 52% and 45% of French, German, UK and US ICUs respectively (Bakhru et al., 2016). Meanwhile, in a study of 192 ICU patients in Australia and New Zealand only 36.5% received early mobilisation and in 84% of 1288 patient-physiotherapy interactions no early mobilisation took place. Furthermore, in patients where muscle strength was measured at discharge, 52% were diagnosed with ICU-AW (TEAM Study Investigators et al., 2015). Importantly, ICU patient mobilisation and physical rehabilitation appear safe and only rarely had negative consequences requiring intervention or additional therapy (Nydahl et al., 2017b).

A multidisciplinary approach to ICU care

The European Society of Intensive Care Medicine (ESICM) considers intensive care medicine to be the result of close cooperation among physicians, nurses and allied health professionals (Valentin et al., 2011). Effective collaboration may even improve patient outcomes (Martin et al., 2010). However, collaboration within the ICU can be complicated by frequent patient handovers, the fluctuations that are inherent with care in the ICU and the complex therapeutic interventions and technical monitoring systems used (Collins et al., 2011).

During the workshop, the nurses suggested that creating a true team of equals who all have a specific role to play could help improve collaboration and patient care. Indeed, the American College of Critical Care Medicine states that the creation of an intensivist-led, high-performing multidisciplinary team (MDT) is critical for delivery of effective care in the ICU (Weled et al., 2015). It has been suggested that an MDT approach can promote guideline implementation and aid standardisation of care while still offering scope for local adaptation (Pandharipande et al., 2014). The use of daily MDT rounds was one of four identified factors that facilitated ABCDE bundle implementation (Balas et al., 2013). Although structural and cultural barriers exist to the promotion of an MDT approach to PAD management, there is enthusiasm for it among HCPs (Pinto and Biancofiore, 2016). While many have embraced MDT rounds more remains to be done to promote their implementation with about half of Italian ICUs and 68% of Philadelphian ICUs performing daily MDT rounds (Pinto and Biancofiore, 2016; Kohn et al., 2017). Multidisciplinary rounds offer an opportunity to improve guideline implementation, but it was the opinion of the panel that they also provide a forum to help bridge gaps between disciplinary priorities. Studies have suggested that poor collaboration among nurses and physicians is an important barrier to optimal delirium care (Trogrlić et al., 2017). The use of MDT rounds within the ICU can help increase interdisciplinary engagement, aiding communication and collaboration. One way of improving the MDT approach is to build a broader ICU MDT. Several disciplines beyond physicians and nurses are also involved in the delivery of ICU care. The creation of an MDT, according to ESICM, should include allied health professionals while calls have been made for pharmacists, respiratory therapists and physiotherapists to be included, as well as ICU patients and their families where appropriate (Valentin et al., 2011; Pandharipande et al., 2014).

Physiotherapists

With the importance of early mobilisation having been demonstrated (TEAM Study Investigators et al., 2015), including physiotherapists within the MDT offers an opportunity to incorporate mobilisation interventions into daily care. Greater focus is being placed on physiotherapy in the ICU and evidence-based, expert-driven recommendations were recently developed (Sommers et al., 2015). The presence of MDT rounds and a dedicated physiotherapist within the ICU were associated with an increased use of early mobilisation (Bakhru et al., 2016), but more still needs to be done to communicate the benefits of early mobilisation to HCPs. Disagreements continue to persist over patient eligibility (Anekwe et al., 2017) and the presence of physiotherapists within ICUs remains heterogeneous.

ICU pharmacists

ICU pharmacists also have an important role to play within the ICU MDT and are recognised as essential by the SCCM (Brilli et al., 2001; Chant, 2012). The addition of a pharmacist to a Dutch ICU significantly reduced the number of prescribing errors and the number of adverse drug events observed (Klopotowska et al., 2010). Meanwhile, a pharmacist-driven awakening and breathing coordination programme resulted in improved rates of screening, performing and coordinating the measures (Stollings et al., 2015). Despite this, the addition of pharmacists to ICU MDTs remains suboptimal. In a 2006 survey of 382 hospitals in the US, only 62% had dedicated ICU pharmacists (Maclaren et al., 2006), while in Philadelphia 73% of ICUs involve clinical pharmacists in daily rounds (Kohn et al., 2017). The situation outside of the US may not be much better with only 74% of critical care pharmacists attending medical rounds (LeBlanc et al., 2008).

Families of ICU patients

The workshop identified that the families of ICU patients play an important role. The Italian representative highlighted the significant support provided by patients' families, while Spanish ICUs increasingly operate an open-door policy for visiting relatives. However, it must be discussed further how much input they should have. Critical care organisations have endorsed a shared decision-making model for ICU care and encourage clinicians to collaborate with patients, or their surrogates, on healthcare decisions. However, it is important that clinicians tailor the decision-making process to the needs or preferences of the patient or their surrogate (Kon et al., 2016). Guidelines for family-centred care were recently published that seek to establish best practices. While

the evidence for many recommendations remains weak, it is suggested that family members be offered the opportunity to participate in MDT rounds to improve communication satisfaction and engagement (Davidson et al., 2017). It remains to be seen whether these recommendations are implemented; just 39% of ICUs in Philadelphia include patients or family members in their daily rounds (Kohn et al., 2017). Meanwhile, in a Canadian ICU attitudes towards a family presence differed by discipline. While physicians supported the presence of family members on daily rounds, most nurses strongly disagreed with more experienced nurses having greater reservations. Over half of respondents felt that a family presence on rounds increased their duration, reduced their educational capacity and limited the delivery of negative medical information (Santiago et al., 2014).

Multidisciplinary rounds offer an opportunity to promote collaboration, improve implementation of intervention bundles and guidelines (Balas et al., 2013), and enhance patient outcomes. Many ICUs continue to utilise single discipline rounds that exclude key stakeholders (Pinto and Biancofiore, 2016; Kohn et al., 2017) highlighting the need to encourage the uptake of MDT rounds.

Improving ICU care and patient outcomes

Changing practices within the ICU is hard (Curtis et al., 2011; De Jong and Jaber, 2015). Promoting behavioural change in a large team of professionals with different challenges and priorities is a considerable barrier (De Jong and Jaber, 2015). Workshop attendees identified and discussed key opportunities to implement guideline-based PAD management.

Increasing access; improving awareness

Implementation of guideline-based care leads to improvements in patient mortality and offers more days free of delirium and coma (Barnes-Daly et al., 2017). However, guideline awareness and use remain sporadic (Miller et al., 2015; Pinto and Biancofiore, 2016). As illustrated during the workshop (Table 1), a variety of international and local guidelines are utilised in European ICUs with the driver frequently being local language availability rather than their applicability or evidence base. This clearly needs to change as it restricts guideline access and awareness, limits implementation and promotes heterogeneity in ICU care.

Providing guideline access to a broader number of ICU professionals is an important first step towards implementation. However, this needs to be supported through sustained educational initiatives (Balas et al., 2013). The workshop identified increased PAD management guideline education as a pressing need. In a survey of 149 ICU nurses and medical staff in the UK, 44% had received no education on ICU delirium (Elliot, 2014). Such educational gaps limit the implementation of guideline-based care and have the potential to negatively impact patient outcomes. To achieve long-term behavioural change, however, educational initiatives need to be sustained. A study of a nurse-led sedation protocol in a paediatric ICU revealed that 12-months after implementation clinical practice had veered away from best practice so that patients had longer sedation, mechanical ventilation and ICU length of stay compared with patients during the intervention period (Yaghmai et al., 2016). The use of ongoing education and tools that promote consideration and awareness of the intervention are essential to help achieve sustained change (Stollings et al., 2015).

A multidisciplinary team of equals

In the management of critically ill patients, effective collaboration within the team can lead to optimisation of medical care, improve patient and staff outcomes and enhance job satisfaction (Baggs et al., 1999; Brilli et al., 2001; Hamric and Blackhall, 2007; Zwarenstein et al., 2009; Reader et al., 2011). An important method to improve collaboration is a multidisciplinary approach that place responsibility on the team rather than individuals. It is important that the roles and responsibilities of each member of the MDT are balanced and everybody's input/contribution is respected. Especially when care is critical, balance is everything and is likely to lead to better team dynamics and improved outcomes. To achieve this balance, communication between different team members is critical. The workshop attendees highlighted that inadequate MDT communication can impact patient care and result in problems such as unclear patient goals.

Another approach is through greater nurse participation and use of summarising. In the MDT rounds of a cardiothoracic critical care unit these interventions improved communication, instruction clarity and patient outcomes (Shaughnessy and Jackson, 2015). The use of checklists, daily goal sheets and protocols, in addition to daily MDT rounds, also improve interprofessional communication and collaboration within the ICU (Rose, 2011). However, many ICUs continue to use traditional, physician-focused rounds limiting input from other disciplines involved in patient care (LeBlanc et al., 2008; Pinto and Biancofiore, 2016; Kohn et al., 2017).

Greater engagement and interaction as an MDT can improve communication and aid implementation of best practice, but could differences in perspective be overcome by changing how physicians and nurses are educated? Medical education frequently remains siloed and the workshop attendees supported calls for greater interprofessional education to improve collaboration (Hartog and Benbenishty, 2014). Interprofessional education and training has been suggested as a means to effectively support ABCDE bundle implementation and adherence (Boehm et al., 2016). However, perspectives on interprofessional education differ between professions, with physician trainees valuing it significantly less than non-physician trainees (Kashner et al., 2017). It is critical that interprofessional education and training is effectively managed as feelings of being coerced into these group settings can result in reinforcement of professional stereotypes and a hierarchy of professions (Pettigrew et al., 2011; Hudson et al., 2016). To overcome some of these concerns the place for interprofessional education may not be in medical school but within practice settings (Paradis, 2016).

Workshop attendees also felt that the published literature on ICU care should better reflect the needs of the MDT. Development of interprofessional publications that provide insights from physicians, nurses and other relevant disciplines offer an opportunity to promote greater understanding of each discipline's concerns, needs and priorities.

From survival to survivorship

In recent years, the mortality rate for ICU patients has fallen significantly (Zimmermann et al., 2013) and the success of ICU management should, therefore, no longer be judged purely on patient survival but also on psychosocial wellbeing (Jackson et al., 2011). With this in mind, the workshop attendees advocated for a shift in focus from survival to survivorship.

Delirium affects a substantial proportion of ICU patients, but its effects are not limited to the ICU. One third of general medical ICU survivors experienced long-term cognitive impairment as a consequence of delirium, with many failing to see their cognitive abilities return to pre-ICU levels (Hopkins and Jackson, 2009). Guidelines advocate the assessment, monitoring and management of delirium to reduce the cognitive impact of an ICU stay (Barr et al., 2013; DAS-Taskforce et al., 2015) and imple-

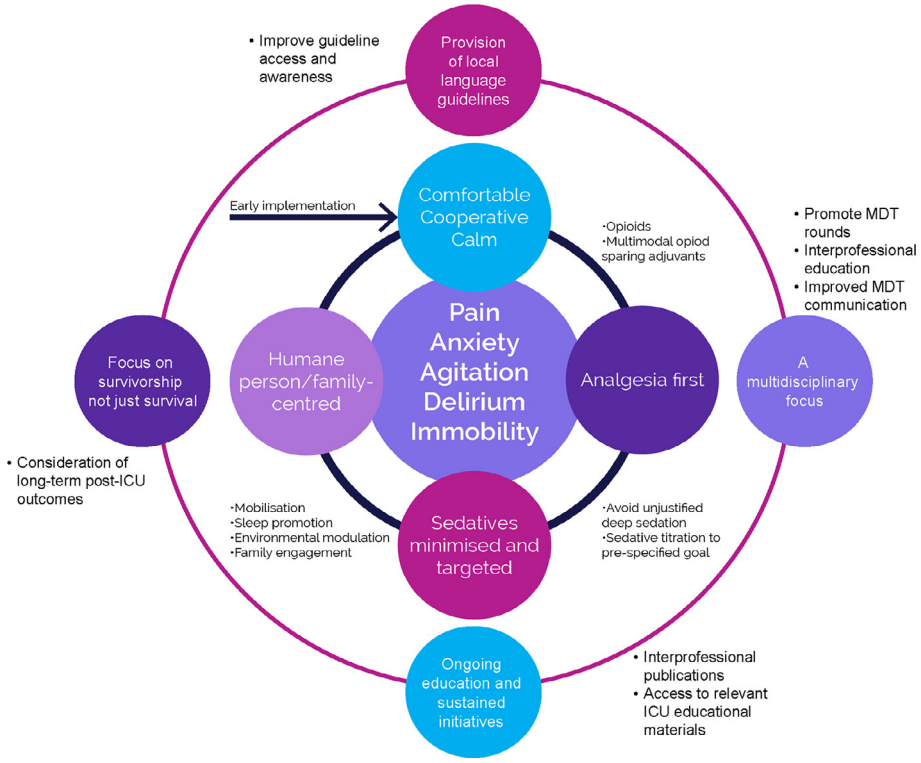

Fig. 1. Extension of the eCASH concept for PAD management in the ICU incorporating outputs from the ICU nurse advisory panel. Adapted from Vincent et al. (2016).

mentation of interventions, such as early mobilisation, can improve patient outcomes (Schaller et al., 2016). The recent eCASH (early Comfort using Analgesia, minimal Sedatives and maximal Humane care) concept builds on the PAD management guidelines to establish optimal care for patients entering the ICU. The core of the eCASH concept is the promotion of patient comfort within a state of light sedation while offering patient-centred care through improved sleep promotion, early mobility and communication with the patient and their family (Vincent et al., 2016).

Focusing changes in clinical practice on the potential patient benefits they offer, as done in the eCASH concept, may help overcome barriers such as interventions being perceived as low priority or too risky (Nydahl et al., 2016; Vincent et al., 2016; Parry et al., 2017).

Conclusions

Recent guidelines that reflect best practice in PAD management within the ICU represent a significant advance on previous standards of care (Barr et al., 2013; DAS-Taskforce et al., 2015; Vincent et al., 2016). However, implementation remains suboptimal potentially impacting the level of care and outcome patients experience (Miller et al., 2015; Pinto and Biancofiore, 2016; Saller et al., 2016; Mo et al., 2017).

The outputs from an ICU nurse-led workshop identified a series of recommendations to aid the implementation of PAD management guidelines into daily clinical practice. These include the translation of international guidelines into local languages, a greater emphasis on multidisciplinary care within the ICU through the provision of interprofessional education, and a focus on patient survivorship in an effort to increase the attention given to long-term patient outcomes and wellbeing beyond survival. These outputs can extend the eCASH concept to further improve ICU patient care and outcomes (Fig. 1).

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Conflict of interest

The authors received an honorarium from Orion Pharma to attend a one-day nurse workshop to provide insight on PAD management across Europe. The authors received no honorarium for their contributions to this manuscript.

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