REVIEW ARTICLE

Management of pain, agitation, and delirium in critically ill patients

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KEY WORDS

agitation, delirium, intensive care unit, pain, sedation

ABSTRACT

Pain, agitation, and delirium (PAD) are common in critically ill patients. Consequently, analgesic and sedative medications are frequently administered to critically ill patients to treat PAD, to improve synchrony with mechanical ventilation, and to decrease the physiological stress response. However, prolonged, continuous deep sedation of intensive care unit (ICU) patients is associated with numerous adverse outcomes, including longer durations of mechanical ventilation, prolonged ICU stays, acute brain dysfunction, and an increased risk of death.

The 2013 ICU PAD Guidelines were developed to provide a clear, evidence-based road map for clinicians to better manage PAD in critically ill patients. Significant knowledge gaps in these areas still remain, but if widely adopted, the PAD Guidelines can help bridge these gaps and will be transformative in terms of their impact on ICU care. Strong evidence indicates that linking PAD management strategies with ventilator weaning, early mobility, and sleep hygiene in ICU patients will result in significant synergistic benefits to patient care and reductions in costs. An interdisciplinary team-based approach, using proven process improvement strategies, and ICU patient and family activation and engagement, will help ensure successful implementation of the ICU PAD Care Bundle in ICUs.

This paper highlights the major recommendations of the 2013 ICU PAD Guidelines. We hope this review will help ICU physicians and other health care providers advance the management of PAD in critically ill patients, and improve patients' clinical outcomes.

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Received: December 3, 2013.
Revision accepted: December 4, 2013.
Published online: December 10, 2013.
Conflict of interest: J.B. is the lead author for the 2013 PAD Guidelines for the American College of Critical Care Medicine. P.P.P. and M.B.P. are members of the Vanderbilt ICU Delirium and Cognitive Impairment Study Group. P.P.P. has received honoraria and research grants from Hospira Inc.
Pol Arch Med Wewn. 2014; 124 (3): 114-123

Introduction Pain, agitation, and delirium (PAD) are commonly observed in critically ill patients. In addition to being unpleasant and often disturbing to the patient, these symptoms can lead to increased endogenous catecholamine activity, oxygen consumption, hypermetabolism, and immune suppression.[1,2] Unfortunately, the majority of patients at medical and surgical intensive care units (ICUs) experience significant pain during their ICU stay, both at rest and associated with movement and procedures.[3,4] Significant pain leads to sleep deprivation, exacerbates delirium and agitation, and is the most common unpleasant recollection of patients' ICU stays.[5,6] Significant pain is also associated with higher incidence of posttraumatic stress disorder in ICU survivors.[7] Delirium occurs in up to 80% of ICU patients, and is frequently underdiagnosed.[8-10] ICU delirium is associated with longer durations of mechanical ventilation and lengths of ICU stay, and an increased risk of death, disability, and long-term cognitive dysfunction in these patients.[11-16] Analgesic and sedative medications are frequently administered to critically ill patients to treat PAD, to improve synchrony with mechanical ventilation, and to decrease the physiological stress response. However, prolonged, continuous deep sedation of ICU patients is associated with numerous adverse outcomes, including longer durations of mechanical ventilation, prolonged ICU stays, acute brain dysfunction (delirium and coma), an increased risk of death, and worse cognitive outcomes.[17-21] Implementing effective strategies to optimize pain management, reduce sedative exposure, and to prevent and treat delirium in ICU patients can lead to

significant improvements in ICU and long-term clinical outcomes in these patients. The American College of Critical Care Medicine, in collaboration with the Society of Critical Care Medicine and American Society of Health-System Pharmacists, have recently published a revised version of the "Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the Intensive Care Unit" (i.e., the PAD Guidelines).[22] This review highlights the major recommendations of these guidelines. We hope it will help ICU physicians and other health care providers advance the management of PAD in critically ill patients and improve patients' clinical outcomes.

Methodology of the 2013 PAD Guidelines The methodological approach to developing the 2013 ICU PAD Guidelines was fundamentally different from the methods used to develop the previous version of these guidelines published over a decade ago.[22-24] First, the PAD Guideline Task Force standardized the literature search process by employing a medical librarian to perform all literature searches using standardized search criteria across 8 clinical databases, and to develop a single online electronic database. These efforts greatly improved the quality and yield of the search results, and provided simultaneous on-line access to all relevant references by all task force members. Second, using the Grading of Recommendations Assessment, Development and Evaluation methodology (GRADE),[25-27] Task Force members developed clinically relevant questions that could be systematically and transparently evaluated using the best available evidence, which could then be transformed into descriptive clinical statements and actionable recommendations. An overall assessment of the strength of the evidence was included for each statement and recommendation. Recommendations were assessed as being either "strong" or "weak". Strong recommendations were identified using the words "we recommend," while weak recommendations were identified by the words, "we suggest." Using the GRADE methodology, the strength of each recommendation was based not only on the strength of the evidence but also on the relative risks and benefits of each intervention. When there was an absence of sufficient evidence, or when group consensus regarding interpretation of the evidence could not be reached, then "no recommendation" was formally made. Consensus statements based on expert opinion alone were not used when the evidence could not support a recommendation. Third, the use of an anonymous, online, iterative voting scheme with predefined voting thresholds was used to achieve group consensus more quickly and transparently for all statements and recommendations, and with a high degree of inter-rater reliability.[27] Finally, the current PAD Guidelines stress the importance of taking a more integrated and patient-centered care approach to managing PAD in the ICU. The PAD Guidelines have been operationalized in the ICU PAD Care Bundle (TABLES 1 and 2), which utilizes bedside PAD assessment tools with strong psychometric properties, and integrates these assessments with PAD treatment protocols that focus on managing pain first, maintaining light levels of sedation, and emphasizing nonpharmacological approaches to managing delirium in ICU patients. The PAD Care Bundle also links PAD management with other evidence-based best ICU practices (i.e., spontaneous breathing trials and early mobility protocols) in order to achieve synergistic improvements in ICU patient outcomes. The PAD Guidelines also include corresponding PAD metrics to help hospitals measure their performance in implementing the ICU PAD Care Bundle.[28,29]

PAD assessment tools The PAD Guidelines advocate routine pain, sedation, and delirium assessments in all ICU patients, employing the most valid and reliable assessment tools with the most robust psychometric properties.[22] Patient self-reporting of pain using a 1–10 numerical rating scale (NRS) is considered the gold standard for pain assessment in patients.[30] However, many critically ill patients are unable to self-report their pain, in which case the Behavioral Pain Scale (BPS) should be used instead.[22] The use of behavioral pain scales in ICU patients has been shown not only to reduce the incidence of significant pain, but also to reduce the inappropriate use of opioids in these patients.[30] The BPS[31] and the Critical-Care Pain Observation Tool (CPOT)[32] are the most valid and reliable behavioral pain scales for use in ICU patients who cannot communicate.[22,32] Vital signs should not be used alone to assess pain, nor should observational pain scales that include vital signs be used in these patients, as vital signs are notoriously unreliable indicators of pain.[33,34] However, vital signs may be used adjunctively for pain assessments.[22] Valid pain assessments are impossible to perform in patients who are paralyzed with neuromuscular blocking agents. The PAD Guidelines otherwise recommend that pain assessments should be routinely performed in all ICU patients at least 4 times per nursing shift, and more often as needed.

Similarly to the 2002 version of these guidelines,[24] the 2013 PAD Guidelines recommend that the depth of sedation should be routinely monitored in all ICU patients.[22] Sedation scales can help identify those ICU patients who are either over or undersedated, and to standardize their sedation management. The use of sedation scales reduces oversedation and the total amount of sedatives administered to ICU patients, while also reducing their duration of mechanical ventilation, the incidence of nosocomial infections, and the ICU length of stay in these patients.[35] The Richmond Agitation-Sedation Scale[36] and Sedation-Agitation Scale[37] are considered to be the most valid and reliable sedation scales for assessing the quality and depth of sedation in these patients.[22,38] The PAD Guidelines

TABLE 1 Intensive care unit (ICU) pain, agitation, and delirium (PAD) care bundle (adapted from the 2013 ICU PAD Guidelines)[22]

	PAIN	AGITATION	DELIRIUM
ASSESS	assess pain ≥4 ×/shift & prn preferred pain assessment tools: • patient able to self-report → NRS (0–10) • unable to self-report → BPS (3–12) or CPOT (0–8) patient is in significant pain if NRS ≥4, BPS >5, or CPOT ≥3	assess agitation, sedation ≥4 ×/shift & prn preferred sedation assessment tools: – RASS (–5 to +4) or SAS (1 to 7) – NMB → suggest using brain function monitoring[b] depth of agitation, sedation defined as: – *agitated* if RASS = 1 to 4, or SAS = 5 to 7 – *awake and calm* if RASS = 0, or SAS = 4 – *lightly sedated* if RASS = –1 to –2, or SAS = 3 – *deeply sedated* if RASS = –3 to –5, or SAS = 1 to 2	assess delirium Q shift & prn preferred delirium assessment tools: • CAM-ICU (+ or –) • ICDSC (0 to 8) delirium present if: • CAM-ICU is positive • ICDSC ≥4
TREAT	treat pain within 30 min then reassess: • nonpharmacological treatment – relaxation therapy[a] • pharmacological treatment: – non-neuropathic pain → IV opioids ± nonopioid analgesics – neuropathic pain → gabapentin or carbamazepin, + IV opioids – S/p AAA repair, rib fractures → thoracic epidural	targeted sedation or DSI (*Goal: patient purposely follows commands without agitation*): RASS = –2 to 0, SAS = 3–4 • if *under sedated* (RASS >0, SAS >4) assess/treat pain → treat w/sedatives prn (non-benzodiazepines[c] preferred, unless ETOH or benzodiazepine withdrawal is suspected) • if *over sedated* (RASS <–2, SAS <3) hold sedatives until at target, then restart at 50% of previous dose	• treat pain as needed • reorient patients; familiarize surroundings; use patient's eyeglasses, hearing aids if needed • pharmacological treatment of delirium: – avoid benzodiazepines unless ETOH or benzodiazepine withdrawal is suspected – avoid rivastigmine – avoid antipsychotics if ↑ risk of Torsades de pointes
PREVENT	• administer preprocedural analgesia and/or nonpharmacological interventions (e.g., relaxation therapy) • treat pain first, then sedate	• consider daily SBT, early mobility, and exercise when patients are at goal sedation level, unless contraindicated • EEG monitoring if: – at risk for seizures – burst suppression therapy is indicated for ↑ ICP	• identify delirium risk factors: dementia, HTN, ETOH abuse, high severity of illness, coma, benzodiazepine use in those at ↑ risk for delirium • mobilize and exercise patients early • promote sleep (control light, noise; cluster patient care activities; decrease nocturnal stimuli) • restart baseline psychiatric meds, if indicated

a nonpharmacological therapy – relaxation therapy, especially for chest tube removal
b brain function monitoring – auditory evoked potentials
c non-benzodiazepines: propofol (use in intubated/mechanically ventilated patients), dexmedetomidine (use in either intubated or nonintubated patients)

Abbreviations: AAA – abdominal aortic aneurysm, BPS – Behavioral Pain Scale, CAM-ICU – Confusion Assessment Method for the Intensive Care Unit, CPOT – Critical-Care Pain Observation Tool, EEG – electroencephalography, ETOH – ethanol, HTN – hypertension, ICDSC – Intensive Care Unit Delirium Screening Checklist, ICP – intracranial pressure, IV – intravenous, NMB – neuromuscular blockade, NRS – Numeric Rating Scale, prn – as needed, RASS – Richmond Agitation and Sedation Scale, SAS – Sedation Agitation Scale, SBT – spontaneous breathing trial

recommend that sedation assessments be performed at least 4 times per nursing shift and more frequently as needed. Sedation scales cannot be used to assess the depth of sedation in ICU patients who are receiving neuromuscular blocking agents. In these pharmacologically paralyzed patients, an objective brain function monitor (i.e., auditory evoked potentials, bispectral index, Narcotrend Index, patient state index, state entropy) may be used as an adjunctive tool to monitor the depth of sedation in these patients. However, in nonparalyzed ICU patients, these brain function monitors are inferior to using bedside sedation assessment tools for assessing the depth of sedation. Electroencephalography should also be used to monitor nonconvulsive seizure activity in ICU patients with either known or suspected seizures, or to titrate electrosuppressive medication to achieve burst suppression in adult ICU patients with elevated intracranial pressure.

Delirium occurs in up to 80% of all ICU patients, but it is frequently undiagnosed. ICU patients who develop delirium are more likely to have a longer duration of mechanical ventilation, a longer ICU length of stay, and an increased risk of death and long-term cognitive dysfunction after ICU discharge. The PAD Guidelines strongly recommend that all ICU patients be routinely screened for delirium at least once a nursing shift, and more frequently as needed.[39] The Confusion Assessment Method for the ICU[40] and Intensive Care Delirium Screening Checklist[41] are

TABLE 2 Intensive care unit (ICU) pain, agitation, and delirium (PAD) care bundle metrics (adapted from the 2013 ICU PAD Guidelines)[22]

	PAIN	AGITATION	DELIRIUM
ASSESS	• % of time patients are monitored for pain ≥4 ×/shift • demonstrate local compliance and implementation integrity over time in the use of ICU pain scoring systems	• % of time sedation assessments are performed ≥4 ×/shift • demonstrate local compliance and implementation integrity over time in the use of ICU sedation scoring systems	• % of time delirium assessments are performed every shift • demonstrate local compliance and implementation integrity over time in the use of ICU delirium assessment tools
TREAT	• % of time ICU patients are in significant pain (i.e., NRS ≥4,BPS ≥6, or CPOT ≥3 • % of time pain treatment is initiated within 30 s of detecting significant pain	• % of time patients are either optimally sedated or successfully achieve target sedation during DSI trials (i.e., RASS = –2 to 0, SAS = 3–4) • % of time ICU patients are under sedated (RASS >0, SAS >4) • % of time ICU patients are either over sedated (*nontherapeutic coma*, RASS <–2, SAS <3) or fail to undergo DSI trials	• % of time delirium is present in ICU patients (CAM-ICU is positive or ICDSC ≥4) • % of time benzodiazepines are administered to patients with documented delirium (not due to ETOH or benzodiazepine withdrawal)
PREVENT	• % of time patients receive preprocedural analgesia therapy and/or nonpharmacological interventions • % compliance with institutional-specific ICU pain management protocols	• % failed attempts at SBTs due to either over or under sedation • % of patients undergoing EEG monitoring if: – at risk for seizures – burst suppression therapy is indicated for ↑ ICP • % compliance with institutional-specific ICU sedation/ agitation management protocols	• % of patients receiving daily physical therapy and early mobility • % compliance with ICU sleep promotion strategies • % compliance with institutional-specific ICU delirium prevention and treatment protocols

Abbreviations: ICU – intensive care unit, DSI – daily sedation interruption (also referred to as Spontaneous Awakening Trial [SAT]), others – see **TABLE 1**

the most valid and reliable tools for detecting delirium in critically ill patients.[22]

Management of pain The ICU PAD Guidelines include a number of strong recommendations for the management of pain in critically ill patients.[22] Pain medications should be routinely administered in the presence of significant pain (i.e., NRS ≥4, BPS >5, or CPOT ≥3) in these patients. Pain medications should also be routinely administered prior to performing painful invasive procedures. Relaxation therapy may provide adjunctive relief pain when administered in conjunction with pain medications, especially for procedural pain. Parenteral opioids are first-line agents for treating non-neuropathic pain in critically ill patients. All opioids, when titrated to similar pain intensity endpoints, are equally effective in ICU patients. But opioids alone may be ineffective at treating neuropathic pain in ICU patients, in which case, either gabapentin or carbamazepine should be administered enterally, in addition to opioids, for the treatment of neuropathic pain. Nonopioid analgesics, such as acetaminophen, nonsteroidal anti-inflammatory drugs, or ketamine, should be used as adjunctive pain medications to reduce opioid requirements and opioid-related side effects in critically ill patients.

Recommendations included in the PAD Guidelines on the use of regional analgesia in ICU patients are limited to the use of epidural analgesia in specific subpopulations of surgical patients, and in patients with traumatic rib fractures.[22] The strongest recommendation for epidural use (based on only moderate quality of evidence) is for thoracic epidural analgesia following abdominal aortic aneurysm (AAA) repair.[22] However, there is no clear benefit to using lumbar epidural analgesia over parenteral opioids in patients undergoing AAA repair. Moderate quality of evidence is conflicting in terms of whether thoracic epidural analgesia is associated with improved clinical outcomes over parenteral opioids in surgical ICU patients undergoing either intrathoracic or nonvascular abdominal surgical procedures; thus, no recommendation is made for using thoracic epidurals in these patients. Finally, the PAD Guidelines put forth a weak recommendation based on moderate quality of evidence for using thoracic epidural analgesia in patients with traumatic rib fractures. More research is needed to determine whether other types of regional analgesia can improve clinical outcomes in critically ill patients undergoing other types of surgical procedures. There is no evidence that the use of any type of regional analgesia is associated with superior clinical outcomes in medical ICU patients.

Management of agitation and depth of sedation The 2013 ICU PAD Guidelines emphasize the importance of minimizing sedative use and maintaining a *light* level of sedation in patients, using either a daily sedative interruption strategy (i.e., spontaneous awakening trial), or by continuously titrating sedatives to maintain a light level of sedation (i.e., targeted sedation strategy). These

guidelines go one step further, defining light sedation as the ability of ICU patients to be aware, and able to purposely follow commands. This is in contrast to the 2002 version of these guidelines, which recommended only that sedatives should be titrated to a tangible endpoint (i.e., sedation score), irrespective of sedation depth, duration, or sedative dose. The 2013 PAD Guidelines also emphasize the importance of assessing and treating pain first, before administering sedative medications to these patients (i.e., analgesia-first sedation strategy).[22]

Over the past decade, much has been published regarding the pros and cons of using various sedative medications in ICU patients in terms of their effects on patient outcomes. Traditionally, benzodiazepines (i.e., midazolam and lorazepam) have been the most commonly administered sedative agents in the ICU, followed by propofol and dexmedetomidine.[42-44] A meta-analysis included in the PAD Guidelines of studies comparing ICU outcomes in patients receiving benzodiazepines (i.e., midazolam or lorazepam) vs. non-benzodiazepines (i.e., propofol or dexmedetomidine) for sedation showed that benzodiazepine sedation is associated with an increased ICU length of stay compared with non-benzodiazepine sedation (i.e., difference, 0.5 d; $P = 0.04$).[22] Based on these results, the PAD Guidelines included a weak recommendation for preferentially using non-benzodiazepines (i.e., propofol or dexmedetomidine) for ICU sedation. A more recently published and updated version of this meta-analysis has reinforced these findings, demonstrating that non-benzodiazepine sedation is associated with an even shorter ICU length of stay than previously estimated (difference, 1.62 d; 95% confidence interval [CI], 0.68–2.55; $P = 0.0007$), as well as a shorter duration of mechanical ventilation (difference, 1.9 d; 95% CI, 1.70–2.09; $P < 0.00001$).[45] The recommendation for using non-benzodiazepines for sedation is a significant departure from the previous ICU sedation and analgesia guidelines, which recommended that benzodiazepines, and lorazepam in particular, be used primarily for ICU sedation.[24] Nevertheless, benzodiazepines remain an important therapeutic option for treating anxiety, seizures, and alcohol or benzodiazepine withdrawal in ICU patients, and may be important when deep sedation, amnesia, or combination sedative therapy is needed to reduce the doses of other sedative agents. Ultimately, the choice of which sedative agent to use in critically ill patients should be driven by the specific indications for sedation and the sedative goals for each patient, compatibility between the clinical pharmacology of a sedative agent and the physiological state of a patient, and the overall costs of sedation (i.e., not limited to pharmacy costs).

The recently published Sedation Lightening and Evaluation of A Protocol (SLEAP) trial tested the hypothesis that combining daily sedation interruption with protocolized sedation that continuously targeted light sedation (i.e., targeted sedation strategy) would result in additional improvements in ICU outcomes.[46] In this multicenter study of 430 adult ICU patients, daily sedation interruption did not reduce duration of mechanical ventilation when combined with a targeted sedation strategy. It is important to note, however, that midazolam infusions were used in both the treatment and control groups (84.9% of the subjects), in doses that were likely to result in deep levels of sedation, especially in the intervention group, which may account for the lack of differences in outcomes between the 2 groups.[47] More research is needed to address these issues.

Management of delirium Antipsychotics, especially haloperidol, are commonly administered for the treatment of delirium in critically ill patients. However, evidence for the safety and efficacy of antipsychotics in this patient population is lacking; hence, the 2013 PAD Guidelines include no specific recommendations for using any particular medication, including haloperidol, to treat delirium in ICU patients. A handful of small studies have suggested that atypical antipsychotics (i.e., quetiapine, ziprasidone, or olanzapine) may reduce the duration of delirium in these patients.[48-50] However, the use of rivastigmine is specifically discouraged in the PAD Guidelines owing to higher mortality rates observed in ICU patients receiving this drug for delirium.[51] The PAD Guidelines also recommend that benzodiazepines should be avoided in ICU patients with delirium unrelated to alcohol or benzodiazepine withdrawal. This is based on the results of 2 large, multicenter trials demonstrating that the prevalence of delirium was lower in patients sedated with dexmedetomidine, compared with patients sedated with benzodiazepines.[52,53]

Delirium prophylaxis with medications is discouraged in the PAD guidelines, but a recent study of delirium prophylaxis with antipsychotics demonstrated that a low-dose haloperidol infusion administered for 12 h in the immediate postoperative period to 457 elderly surgical ICU patients who had undergone noncardiac surgery, was shown to significantly reduce the incidence of delirium within the first 7 days postoperatively in these patients.[54] In another study of a delirium prophylaxis regimen published by Dutch researchers, 177 mixed-specialty adult ICU patients received haloperidol prophylaxis (1 mg IV every 8 h) if their delirium risk factor score (i.e., PRE-DELIRIC score) was greater than 50%.[55] When compared with 299 ICU patients in the preintervention period, haloperidol prophylaxis significantly reduced the incidence and prevalence of delirium in these patients. By contrast, the HOPE-ICU randomized controlled trial showed no benefit of haloperidol administration for delirium prophylaxis in a mixed population of medical and surgical adult ICU patients.[56] Larger placebo controlled trials assessing the safety and efficacy of haloperidol and

atypical antipsychotics for delirium prophylaxis in ICU patients are needed.

The only strategy strongly recommended in the PAD Guidelines to reduce the incidence and duration of ICU delirium, and to improve functional outcomes, is the use of early and progressive mobilization of ICU patients. This includes daily active range of motion exercises, with progression of patients to sitting, transferring, standing, and walking, even in those patients who are intubated and mechanically ventilated. The PAD Guidelines also recommends the practice of promoting sleep hygiene to reduce delirium in ICU patients, by using strategies to control light and noise in the ICU, and by clustering patient care activities and decreasing physical stimuli at night to prevent sleep disruption in these patients.[22]

Potential benefits of PAD Guideline implementation

If fully and widely implemented, the ICU PAD Care Bundle is expected to significantly improve ICU outcomes across adult ICU patient populations, to reduce health care costs, and to improve long-term outcomes in ICU survivors.[47] Duration of mechanical ventilation, the incidence of complications associated with mechanical ventilation (i.e., nosocomial infections, deep-vein thrombosis, gastrointestinal bleeding),[57] ICU length of stay, and ICU mortality are all expected to decrease. Given that the additional cost of mechanical ventilation is estimated to be $1500 per patient-day,[58] this has important economic implications for hospitals and health care systems. Hospital length of stay and mortality are also expected to decrease, while the functional status of these patients at the time of hospital discharge is expected to increase, meaning that fewer patients are likely to be discharged to a skilled nursing facility. Long-term quality of life for ICU survivors, in terms of their functional and neurocognitive status, is also likely to improve, with more of these patients able to return to their previous level of function that they enjoyed prior to their critical illness. Previous studies have demonstrated that integrating individual elements of the ICU PAD Care Bundle, results in synergistic improvements in clinical outcomes and significant cost reductions for ICU patients.[18,59-65] Similar synergistic benefits have resulted from taking an integrated, evidence-based approach to managing septic patients using the sepsis bundle.[66]

Implementing the ICU PAD Guidelines The first step towards successful implementation of the PAD Care Bundle is to assemble a multidisciplinary ICU PAD clinical stakeholder group, which includes early adopters of the PAD Guidelines from Nursing, ICU Physician groups, Pharmacy, Respiratory Therapy, Physical Therapy, and ICU patients and their families.[28] Before embarking on implementation of the ICU PAD Care Bundle, it is important to understand what the differences are between current practice patterns and PAD Guideline recommendations in your ICUs. Data gathering for an ICU PAD Care Bundle gap analysis should be broad and involve interviews, surveys, and observations of interprofessional practitioners working in the ICU with varying levels of experience. Once the gap analysis is complete, it is important to engage key stakeholders in hospital administration and quality improvement. To increase the likelihood of having resources allocated towards the identified gaps, it is useful to have a positively framed "PAD Guideline elevator speech" that summarizes in 3 to 4 sentences the areas of change needed, while incorporating the concepts of outcome, safety, satisfaction, and cost.[28]

The ICU PAD Guidelines promote PAD management strategies over medications, without advocating for a one-size-fits-all approach to PAD protocol development and implementation. Given the variation in ICU practice patterns and patient populations, PAD protocols that have a high likelihood of success should be adapted and developed locally to match each ICU structure and culture. This allows your PAD stakeholders group some freedom during the PAD protocol development and order-set creation, and will increase staff buy-in. Although protocols facilitate consistent bedside practices with aims to minimize treatment delays, it can be difficult to develop and implement PAD protocols that effectively translate evidence-based knowledge into clinical practice. The ICU PAD Care Bundle can help align personnel and coordinate interprofessional care. The Society of Critical Care Medicine (www.sccm.org) is currently developing online tools and tutorials to help ICUs successfully implement the PAD Care Bundle. The American Association of Critical Care Nurses (www.aacn.org/pearl) has additional evidence-based resources to help facilitate implementation of the PAD Care Bundle elements (i.e., the ABCDE bundle, which stands for Awakening and Breathing trial Coordination, Delirium monitoring and management, and Early mobility). Creation of the ABCDE bundle preceded the publication of the PAD Guidelines and the ICU PAD Bundle, but has helped to facilitate understanding of the importance of integrating PAD management with other best practices, such as spontaneous breathing trials and early mobility.[67] The ICU PAD Care Bundle is also more explicit than the ABCDE bundle in its approach to prioritizing and integrating the assessment, treatment, and prevention of significant pain, over- and undersedation, and delirium in critically ill patients. It promotes PAD assessments using validated bedside monitoring tools, and ties the results of these assessments to PAD treatment strategies. It also specifies both pharmacological and nonpharmacological PAD treatment and prevention strategies. Finally, the PAD Care Bundle also links PAD management strategies with breathing trials, early mobility protocols, and environmental management strategies to preserve patients' sleep–wake cycles to achieve synergistic improvements in ICU patient outcomes.

The PAD Care Bundle also includes corresponding metrics to assess PAD performance in your ICU.

Barriers to implementing the PAD Guidelines Current ICU practices for PAD management are heterogeneous, and the barriers preventing the implementation of evidence-based sedation practices are numerous.[68] In a 2009 multidisciplinary web-based anonymous survey of the members of the Society of Critical Care Medicine, albeit with a response rate of 7.1% (994 of 12,994), barriers to using sedation protocols and daily sedation interruption included a lack of nursing acceptance, difficulty coordinating sedation interruption with physicians' schedules, and concerns about patient safety, respiratory comfort, and self-extubation.[69] Specific efforts to determine the facilitators and barriers to ABCDE bundle adoption were performed in a recent, 18-month prospective before-after study in a mid-western academic medical center among 7 distinct ICUs. Although the generalizability of a single center study is limited, and the response rate was low for the focus groups and surveys, barriers believed to impede bundle implementation included inconsistent medical practice, reluctance to follow protocols (new or old), fear of protocol-related adverse events, care and coordination challenges, workload concerns, documentation burdens, and time constraints. Despite these challenges, participants believed that bundle implementation ultimately benefited patients, improved interdisciplinary communication, and empowered nurses and other ICU team members.[70] In contrast to the ABCDE bundle, there may be lower barriers implementing the PAD Care Bundle given the fact that pain management is a priority, and there is greater specificity with linking specific PAD assessment tools to PAD management protocols.

Overcoming barriers to implementation Successful implementation of the ICU PAD Care Bundle requires effective interprofessional education and communication in the ICU, successful implementation of PAD bedside assessment tools, standardization of PAD management practices, and breaking the cycle over sedation and immobility of ICU patients.[71] Staff education alone cannot be relied upon as the sole mechanism to motivate change at the bedside, but practice behavior can be changed using point-of-care education or small group feedback (academic detailing)[72] and ongoing bedside data collection for compliance efforts (rounding with a purpose).[73] Without direct observation and feedback to staff during all ICU shifts, any attempted change will be thwarted. Sharing data with all ICU stakeholder groups demonstrating PAD improvements (or not) can also help motivate staff to adopt new practices, boost staff morale, and provide a positive feedback loop.[28]

Other methods to overcome implementation barriers include creating multicenter partnerships and voluntary peer networks that create mutual opportunity and accountability for collaboration, analysis, and commitment to specific goals. Interinstitutional meetings may enhance timelines and processes when participants are mutually accountable for results. Also, there may be more effective leadership and success by having direct authority and responsibility granted to nonphysician personnel to implement the PAD Care Bundle.[74]

Conclusions The 2013 ICU PAD Guidelines provide a clear, evidence-based road map for clinicians to better manage PAD in critically ill patients. Significant knowledge gaps in these areas remain, but if widely adopted, the PAD Guidelines will nevertheless be transformative in terms of their impact on ICU care, perhaps even more so than the Sepsis Guidelines have been. The full impact of implementing the ICU PAD Care Bundle on ICU patient outcomes and health care costs has yet to be tested and measured. However, strong evidence indicates that linking PAD management strategies with ventilator weaning, early mobility, and sleep hygiene in ICU patients will result in significant synergistic benefits to patient care and reduction in costs. An interdisciplinary team-based approach, using proven process improvement strategies, and ICU patient and family activation and engagement will help ensure successful implementation of the ICU PAD Care Bundle in your ICUs.

Acknowledgments This publication was supported in part by the Vanderbilt Physician-Scientist Development Program (MBP).

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ARTYKUŁ POGLĄDOWY

Leczenie bólu, pobudzenia i majaczenia u chorych w stanie ciężkim

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SŁOWA KLUCZOWE

ból, majaczenie, oddział intensywnej terapii, pobudzenie, sedacja

STRESZCZENIE

U chorych w ciężkim stanie ogólnym często występują ból, pobudzenie psychoruchowe i majaczenie (*pain, agitation, and delirium* – PAD). Zwalczanie tych objawów, a także poprawa współpracy z respiratorem i zmniejszenie fizjologicznej reakcji stresowej są powodem częstego stosowania leków przeciwbólowych i sedatywnych. Niestety, przedłużona, ciągła sedacja chorych leczonych na oddziałach intensywnej terapii (OIT) wiąże się z wieloma niekorzystnymi następstwami, takimi jak wydłużenie mechanicznej wentylacji, dłuższy pobyt na OIT, ostra dysfunkcja mózgu oraz zwiększone ryzyko zgonu.

Wytyczne postępowania w PAD dla OIT z 2013 r. opracowano, aby dostarczyć lekarzom jasne i oparte na danych naukowych wskazówki dotyczące lepszego leczenia tych objawów u chorych na OIT. Wciąż istnieją znaczące luki w wiedzy na ten temat, ale szerokie rozpowszechnienie omawianych wytycznych może pomóc w ich uzupełnieniu i będzie czynnikiem przeobrażającym opiekę na OIT. Silne dane wskazują, że połączenie metod postępowania zalecanych w wytycznych z odpowiednim odłączaniem mechanicznej wentylacji, wczesnym uruchamianiem i zapewnianiem higieny snu u chorych na OIT będzie dawać synergistyczne korzyści w zakresie opieki nad chorymi oraz redukcji kosztów. W celu pomyślnej implementacji „pakietów PAD" na OIT należy stworzyć interdyscyplinarne zespoły, wykorzystując sprawdzone strategie doskonalenia procesów oraz aktywizując i angażując samych pacjentów i ich rodziny.

W niniejszym artykule przedstawiono główne zalecenia wytycznych PAD 2013 dla OIT. Autorzy mają nadzieję, że przegląd ten będzie pomocą dla lekarzy pracujących na OIT oraz dla innych pracowników medycznych w lepszym leczeniu bólu, pobudzenia i majaczenia u ciężko chorych pacjentów, a także że przyczyni się do poprawy wyników leczenia.

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Praca wpłynęła: 03.12.2013.
Przyjęta do druku: 04.12.2013.
Publikacja *online*: 10.12.2013.
Zgłoszono sprzeczność interesów: J.B. jest głównym autorem Zaleceń PAD 2013 z ramienia American College of Critical Care Medicine. P.P.P. i M.B.P. są członkami grup badawczych Vanderbilt ICU Delirium oraz Cognitive Impairment Study Group. P.P.P. otrzymuje honoraria i granty badawcze od firmy Hospira Inc.
Pol Arch Med Wewn. 2014; 124 (3): 114-123
Tłumaczył lek. Łukasz Strzeszyński