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The ABCDEF Bundle: Science and Philosophy of How ICU Liberation Serves Patients and Families

E. Wesley Ely, MD, MPH, FCCM

Professor of Medicine and Critical Care, Associate Director of Aging Research, Tennessee Valley Veteran's Affairs Geriatric Research Education Clinical Center (GRECC), Center for Health Services Research, 6109 Medical Center East, Vanderbilt University Medical Center, Nashville, TN 37232-8300

Abstract

Over the past 20 years, critical care has matured in a myriad of ways resulting in dramatically higher survival rates for our sickest patients. For millions of new survivors comes *de novo* suffering and disability called the Post-Intensive Care Syndrome (PICS). Patients with PICS are robbed of their normal cognitive, emotional, and physical capacity and cannot resume their previous life. The **ICU Liberation Collaborative** is a real-world quality improvement (QI) initiative being implemented across 76 ICUs designed to engage strategically the ABCDEF bundle through team- and evidence-based care. This article explains the science and philosophy of liberating ICU patients and families from harm that is both inherent to critical illness and iatrogenic. ICU Liberation is an extensive program designed to facilitate implementation of the Pain, Agitation, and Delirium (PAD) guidelines, using the evidence-based ABCDEF Bundle. Participating ICU teams adapt data from hundreds of peer-reviewed studies to operationalize a systematic and reliable methodology that shifts ICU culture from the harmful inertia of sedation and restraints to an animated ICU filled with patients who are awake, cognitively engaged, and mobile with family members engaged as partners with the ICU team at the bedside. In so doing, patients are *liberated* from iatrogenic aspects of care that threaten her or his sense of self-worth and human dignity. The goal of this 2017 plenary lecture at the 47th SCCM Congress is to provide clinical ICU teams a synthesis of the literature that led to the creation of ICU Liberation philosophy and to explain how this patient- and family-centered, QI program is novel, generalizable, and practice-changing.

Address for correspondence: E. Wesley Ely, MD, MPH, Professor of Medicine and Critical Care, Associate Director of Aging Research, Tennessee Valley Veteran's Affairs Geriatric Research Education Clinical Center (GRECC), Center for Health Services Research, 6109 Medical Center East, Vanderbilt University Medical Center, Nashville, TN 37232-8300, wes.ely@vanderbilt.edu, www.icudelirium.org.

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One thing most physicians detest is being told what to do or seeing some "recipe" put forth for their patients' medical care. We know what we do is a professional calling and an art; we are not merely medical providers or technicians. ICU Liberation is not meant as a recipe or a "protocol" to be blindly followed. Quite the opposite. Some of you may, without reading this synthesis, practice up-to-date and seamless ICU care. If so, then the science and philosophy of ICU Liberation are yours and this manuscript will be of help perhaps as a way of "packaging" what you already do. However, having visited many hundreds of ICUs around the world, I have not seen even one (including those in which I am privileged to serve patients and their families as an attending) that I think practices these ICU Liberation concepts well enough.

Keywords

sepsis; mechanical ventilation; sedation; analgesia; critical care; intensive care unit; delirium; coma; long-term cognitive impairment; dementia; pain; early mobility; family engagement; ABCDEF bundle; ICU liberation; protocol; weaning; PAD; implementation; quality improvement; patient safety; medical error; caregiver burden; survivorship

Prologue

“I had septic shock 4 years ago from urosepsis and I’m in my 50s. I am writing because I have never felt like myself again. I can’t think clearly, my memory has suffered. I am fatigued like never before. Before sepsis I was active, hiking, biking, rock climbing, running and now I am sedentary. I have seen doctor after doctor and they look at me like I am nuts. Maybe I am not the only one. This has affected every aspect of my life, I even had to leave my job as an ICU nurse because it was wearing me out – I couldn’t handle it which kills me. I am that nurse you gave your hard patients to, the difficult families, hard traumas. Not anymore. I just can’t handle it. Do you have any advice for me? What doctors to see? How to explain what is going on with me? Meds? Any treatments to get back to where I was? Or Doctors that specialize in post sepsis treatments. I need help.”

ICU Survivor who wrote to www.icudelirium.org in
2016

I will never forget my horror as a resident in 1992, standing at a 28-year old patient’s bedside and looking at his massive anasarca while we were attempting to increase his oxygen delivery. Showing him to my attending, I asked if we could slow down his IV fluids and change his ventilator settings. She quipped, “I don’t give a rat’s ass how he *looks*; we haven’t achieved our target D dot O 2 yet, and his I:E ratio isn’t where we need it.” (1, 2) This sedated, paralyzed, and immobilized patient went on to survive, but the severe myositis ossificans and heterotopic ossification he developed during ICU admission prevented him from being able to resume his life as an active young man. What’s worse is that I as his physician had no ‘eye’ on the long-term dismantling of his life and no awareness that I had contributed to his demise.

Half Century Build-Up: Evolution of the Science and Philosophy of ICU Liberation

“We shall not cease from exploration, and the end of all our exploring will be to arrive where we started and know the place for the first time.” -T.S. Eliot.

Critical Care was a nascent field some 50 years ago, with Ashbaugh Bigelow Petty and Levine’s pivotal 1967 Lancet article describing ARDS. (3) The now recognized iatrogenic component to ARDS’s evolution (4) and resolution (5) has a poignant message that is relevant to the core points I will address in this manuscript about our capacity to add insult to injury.

Let's divide the 50 years of our field into its two quarter centuries. At the end of the first ~25 years, the science and philosophy of ICU Medicine had evolved by the early 1990s into the following thought process in our minds as intensivists: *"This patient has sepsis, so according to our appropriately strict visitation policy, his wife and loved ones will mostly be in a waiting area away from the bedside while we sedate and paralyze him in a state of suspended animation for the next 4 to 10 days [again Petty taught us (6)]. We will unveil a mighty arsenal of tools from our trade to fix 'things.' Then, when we judge that he's better, we'll allow him to wake up and stutter back into life. I'm not sure what the family is going to get back as a husband once this is over, but dealing with his aftermath is not really my job. My complicated job is to get her husband into the living column at whatever cost."*

We have matured as a field since then, and indeed we "stand on the shoulders of giants." Thus, the first quarter century made possible the second 25 years of science. The current philosophy of critical care in 2017 could be expressed as follows: *"This woman has sepsis with septic shock, and we have put her on medicines to fight infection and placed her on life support. She is stabilizing, and since we know that the initially helpful aspects of sedation and mechanical ventilation can at some point contribute to slowing her recovery or even injuring her if overused, we will actively test her every day so that she can show us when it is safe to liberate her from both. In the meantime, we are going to do all that we can to keep her pain free and give her only as much sedation as is required to cover her anxiety.(7, 8) We want her family and friends to be present at the bedside to help us care for her and to keep her oriented and urge her to work with our team to get out of the bed and begin walking as soon as possible. After ICU discharge, we will hopefully be able to see her back in our Post-ICU Clinic to help transition through the long-term sequelae of critical illness that she will be experiencing."*

In the ICU, a patient's clinical course can be loosely divided into the "front end" and "back end" of care. Throughout the '80s and '90s, our focus was almost exclusively on improving the front end: for example, how we diagnosed and treated different forms of shock or managed complex forms of mechanical ventilation. The maturation of the "front end" ultimately shifted patients more often from death to life (9)...*but to what life?*(10) The first two decades of the 21st century have increasingly been focused on improving survivorship globally. (11, 12) An immense amount of research has now been conducted on the "back end" of critical care, that is, the period of time after initial medical stabilization of our patients, forward through the remainder of their hospital stay and into their return home.

The "What" of ICU Liberation

The patient is to be *liberated from* anything that threatens his or her sense of self-worth, identity and human dignity. This is perhaps especially important during the dying phase of our patients. (13, 14) Despite benevolent intentions, we have created a culture in many ICUs that threatens patient ability to maintain dignity and return to the life they knew. An abundance of data summarized in the Pain Agitation Delirium (PAD) guidelines (15, 16) have emerged that provide a convincing evidence-based path for ICU clinicians to liberate patients efficiently and reliably from iatrogenic harm as they recover from critical illness. To harness evidence and translate it reliably into the practice setting, an interprofessional group

of critical care practitioners in 3 regions of the United States (sponsored by the Gordon and Betty Moore Foundation for this first phase of work) were charged with leading the SCCM's **ICU Liberation Collaborative**, a large scale quality improvement (QI) program to implement the PAD Guidelines. In total 108 applications were received and 67 adult and 9 pediatric ICUs who met acceptance criteria were invited to participate (Figure 1). The ICU Liberation (www.iculiberation.org) and Thrive (www.sccm.org) initiatives, 2 linked programs of the SCCM designed to be synergistic, present innovative strategies to operationalize the published evidence with regard to how ICU and post-ICU care can be restructured to help mitigate the Post Intensive Care Syndrome (PICS). (17, 18)

What this is NOT: ICU Liberation is not a static construct or cook-book medicine or a set of protocols to be rigidly applied. Indeed, overly rigid adherence to a protocol can have unintended consequences such as delayed extubation for patients who spend days barely failing a firmly applied F/Vt threshold and thus don't move on to and SBT.(19) Clinical judgment is still needed in decision making. ICU Liberation is not a situation where one set of people think they know better than others—excellent quality improvement engages all members of an interprofessional team. The idea in ICU Liberation is to generate a framework that is updated in real time as new data emerge, adapted to individual institutional preferences and needs, and implemented globally. The concepts were designed to help all types of ICU programs with varying patient populations (small and large, community and academic, public and governmental institutions) across nations to achieve enduring change at the bedside, which can be extremely difficult.

In medicine there is resistance to change until we see consistency of message. Whether an early adopter or a laggard,(20) change in medical practice most readily occurs when data are consistent across study types and patient populations. This consistency is precisely what ICU Liberation was built on, both at the level of original randomized trials conducted on individual bundle elements and with regard to the data once these elements were bundled and studied together.(21, 22)

The “Why” of ICU Liberation

The most salient aspects of post-ICU human suffering, encapsulated by PICS, are pronounced decline in our patients' cognitive, emotional, mental health, and physical abilities. These ICU-acquired brain and body disabilities dismantle ICU survivors' lives. The knowledge that a severe polyneuropathy occurs during critical illness was revealed by investigators like Bolton and Latronico (to mention just two) in '80s and '90s.(23–25) This “neck down” problem following critical illness is referred to as ICU-acquired weakness (ICU-AW),(26) and its epidemiology and significance have subsequently been more concretely documented.(27–29) Its bookend, which was also discovered in the '90s, is a profound “neck-up” long-term cognitive impairment or critical illness brain injury, (30–32) the epidemiology and severity of which have also been further understood phenotypically to be an acquired dementia-like injury found similarly in surgical and medical patients (33) and on par with Alzheimer's disease and traumatic brain injury.(33–36) Critical illness brain injury is the most personal aspect of PICS, and the type of injury for which almost 90% of patients say they would forgo our interventions altogether.(37) Tasker and Menon wrote,

“The most salutary lesson of intensive care over the last decade—the minimization of iatrogenic injury—perhaps applies more to the brain than any other organ.”(38) The full weight of the public health implications of PICS brings to light the “why” of ICU Liberation, including not only ICU-AW and long-term cognitive impairment, but also attendant depression, post-traumatic stress disorder (PTSD), personal and societal costs, and family/caregiver burden.(39–44)

The “Construction” of ICU Liberation and the ABCDEF Bundle

By its very nature, the ABCDEF Bundle (45–47) is not a fixed construct, but a living/ breathing and thus evolving approach to the back end of critical illness that presents a framework upon which to adopt new data [similar to how other bundled ICU lists can change with new data (48, 49)] keeping the patient’s needs as the ultimate goal. Figure 2 (47) is a schematic to outline showing that symptoms of pain, agitation, and delirium are to be monitored routinely using valid and reliable tools as recommended by the evidence-based PAD guidelines. These guidelines are scheduled to be updated in 2017, and those updated guidelines will be used to identify any needed modifications to ICU Liberation for the bedside ICU team.

While there are hundreds of manuscripts that contributed to the “build” of the ABCDEF Bundle (see slide sets at <http://www.iculiberation.org/Bundles/Pages/default.aspx>), for brevity this overview will present just those from the 3 highest impact clinical journals: *Lancet*, *JAMA*, and *New England Journal of Medicine*. From the outset, let me point out two caveats about this approach, which I adopted both to stress the degree of high impact literature that formed the bundle and to respect the journal’s request against citing several hundred publications. First, as with all aspects in medicine, there are aspects of this field about which reasonable doubt remains, often raised in less substantive publications not cited here. Second, most of the literature that I cite in the paragraph below is from randomized controlled trials (RCTs). This is not to say that RCTs are to be uniformly treated as “gold standards.” There can be limitations in such trials derived from the generalizability of inclusion/exclusion criteria, management of the control group, and overly-valued surrogate outcomes chosen as primary endpoints. Other aspects of doubt and errant use of the bundle are discussed below in the “Dosing” subheading.

The only section of the bundle that doesn’t have references in these high-impact journals is the “**A**” related to “**Assessment, Prevention, Management of Pain**.” Having said that, no one in medicine would deny the importance of starting with pain relief as the most basic element of what clinicians must provide in service to ICU patients. The “**B**” stands for **Both SATs and SBTs** (Spontaneous Awakening Trials and Spontaneous Breathing Trials) as well as their coordination between nurses and respiratory therapists; it is supported by data demonstrating large reductions in mortality and length of stay.(50–52) “**C**” calls for special attention to **Choice of Sedation and Analgesia**, and it is supported by numerous investigations that *en masse* reveal that patients spend less time on the ventilator and are more likely to be delirium free if maintained at an “awake and alert” arousal level or lightly sedated using medications other than GABA-ergic benzodiazepines.(53–58) The “**D**” reminds that **Delirium Assessment, Prevention, and Management** (59–61) will allow

detection of otherwise missed “quiet” delirium and trigger patient-centered interventions to reduce the duration of brain organ dysfunction via adherence to each of the various aspects of the bundle elements. “**E**” points to **Early Mobility and Exercise** representing both the oldest and the newest piece of the bundle, since it was used, abandoned, and is now on the rise again (Figure 3A–C).(27–29, 62–65) This aspect of the bundle requires an up-front investment by the team (and not just therapists but most importantly the nurses, as mobility is considered a primary role of the nursing profession). This new way to work is at times more challenging because it involves actively getting patients off sedation and out of bed while still intubated. The lives of patients are at the heart of what motivates us, and this up-front investment can reap tremendous rewards for our patients later when they are able to return home with their “selves” intact. The “**F**” of **Family Engagement and Empowerment** was the latest addition to the bundle and was sparked by the Gordon and Betty Moore Foundation, who served as the sponsor of this program. Robust literature exists regarding family involvement in the ICU that provided for its logical inclusion into all facets of ICU Liberation.(44, 66–68)

What is helpful about this list (50–68) of investigations that served as the basis for the individual pieces of the “packaged” bundle (45–47) is that once studied together, the literature shows a consistent message of improvement in patient outcomes. (21, 22, 69–74) It is beyond the scope of this manuscript to review all of these “bundle” studies, so I will focus on just four: (1) In 2014, Balas et al. (21) published a single center study that demonstrated bundle implementation was associated with a 3 day improvement in ventilator free days ($p=0.04$), 15% less days delirious ($p=0.003$), improvements in multiple measures of ICU mobilization ($p=0.005$), and higher 28-day hospital survival ($p=0.04$). (2) In 2015, Klompas and colleagues (72) published a study sponsored by the Center for Disease Control (CDC) that included 20 ICUs and 5,164 consecutive ventilator days. This “wake up and breathe” collaborative was essentially built on the original ABC portions of the bundle and demonstrated that use of the ABCs resulted in 37% fewer ventilator-associated events (VAEs) and 65% fewer infection-related ventilator-associated complications (IVACs). (3) Trogrlic and his team (69) conducted a meta-analysis of implementation strategies for reducing ICU delirium and found from the 21 studies included that programs with 6 or more bundle elements (exactly the same number of elements as the ABCDEFs) resulted in statistically lower mortality and shorter lengths of ICU stay. (4) Perhaps the most impressive of all is the multi-site Sutter investigation by Barnes-Daly (22) published in this issue of *Critical Care Medicine* that studied over 6,000 patient days and showed a dose-response to ABCDEF bundle implementation. After adjusting for age, APACHE II, and mechanical ventilation, multivariable analysis showed that every 10% increase in compliance with the ABCDEF bundle predicted both a 15% higher chance of survival and of being delirium and coma free the following day.

The “Dosing” of ICU Liberation and the ABCDEF Bundle

It is a certainty that some hospitals will implement “new protocols” and not see an improvement in outcomes. Very important contributions to the field in this regard are derived from trials by Mehta, (75) Moss, (76) and Morris (77) that represent excellent examples of how changes in compliance with different elements of the ABCDEFs or differences in

implementation strategies can alter and even erase outcome benefits seen in earlier trials. Sometimes neutral outcome benefits are seen despite high compliance, which indicates either that prior to the QI effort the system was already doing what was newly protocolized (78) or that the protocol doesn't work in their specific patient population. (79) More common in the real world clinical setting, however, is that hospitals make a decision “on paper” to make practice changes that never really make it to the bedside (i.e., low compliance). The “dose” of the ABCDEFs matters, as shown beautifully in the study appearing in this issue of CCM by Barnes-Daly.(22) We can expect that when, for example, we design a program to reduce exposure to benzodiazepines or extubate patients who pass spontaneous breathing trials, patient outcomes will stay the same (i.e., not improve) if compliance with those elements is not high. Burry and colleagues, about their study incorporating 712 patients and over 3,500 patient-days, wrote: “We found that nearly all patients were managed with continuous-infusion opioids and sedatives. We also found that actual practice was different from what we expected because the available clinical tools – such as protocols and assessment scales – were not necessarily applied at the bedside.” (80) An example of high compliance and good results is provided by repetitive studies at Johns Hopkins, where most elements of the ABCDEFs are being tested and shown consistently to improve outcomes, (73, 81, 82) speaking to the fact that even world-class institutions can improve and must continue to strive towards excellence. In their most recent publication from 327 patients, Kamdar and colleagues found key modifiable items that slashed patients' likelihood of participation in physical therapy were higher use of benzodiazepines and sedative drips and presence of delirium. Complementing these findings directly, Michigan's 51 hospital Keystone ICU Collaborative showed that higher dose implementation of spontaneous awakening trials and delirium screening yielded a tripling of the likelihood of exercising patients on mechanical ventilation.(83) In the same study, incomplete or non-sequential bundle implementation yielded lower success rates. The authors concluded that these findings were “another layer of evidence that for the ABCDE[F]s, the whole is greater than sum of the parts.”

The “How” of ICU Liberation

What is clear is that adopting the science of ICU Liberation involves a difficult adoption process that must include philosophy and culture. Working gradually, through the process of change to employ these interventions, serves patients and their families by mitigating downstream disabilities caused by illness and iatrogenic harm. (74, 84) Some of the most successful hospitals to achieve lasting change have been the small community hospitals, which are nimble and readily embrace the Institute for Healthcare Improvement (IHI) concept of “small tests of change” and plan, do, study, act (PDSA) cycles. (84) rather than trying to “launch” a wholesale revamping of interprofessional rounds. On the other hand, major hospital systems such as Kaiser Permanente, (74) which participated in the IHI's Rethinking Critical Care Collaborative, (84) have harnessed network abilities to accomplish large scale QI projects similar to that designed by Klompas in his CDC initiative.(72) Through both IHI and SCCM collaboratives, teams are taught to avoid the pitfall of trying to “climb Mt. Everest” and instead to maintain the simple mantra of starting one patient at a time using small tests of change and adopting IHI's widely used “what can you do by

Tuesday” motif. This approach builds good will for the entire team by seeing the work in action initially on an individual patient level. Starting with perhaps just 2 or 3 people and a single patient (either on or off a ventilator since “liberation” is applicable ICU-wide), ABCDEF bundle concepts including assessing for and managing pain, both SATs and SBTs, choice of drug, delirium monitoring, early mobility, and family involvement are applied at the bedside. From that experience, things are tweaked the following day and others are brought into the conversation so that ultimately a culture of ICU Liberation is endorsed by all members of the interprofessional ICU team including the nurse, respiratory therapist, pharmacist, physical and occupational therapists, social worker, chaplain, nurse practitioner or physician assistant, and physician.

Overcoming Negligence as a Global ICU Community

Why would it be that a 2014 point prevalence study from 116 ICUs in Germany would report that only 2% of patients requiring mechanical ventilation stood beside the bed and only 1% marched in place or walked? (85) If this is what is happening in a country with one of the most advanced systems of healthcare on the planet, what is happening elsewhere? Some of our most senior statesmen in Critical Care have called us out regarding what can be thought of as negligence on our part. Both Petty (6) and Clemmer (86) ask, “What are we doing and why are we so slow to change?” Clemmer frankly states that we should be frustrated by our attitudes and actions towards change with regard to oversedation, delirium, and sleep. We are either too convinced that our practice is correct and adequate or that nothing within reason can be done to alter our patients’ path forward. We think that patients will be too uncomfortable or have bad memories, when the lion’s share of data challenging these assumptions demonstrates this to be false. What the ICU community now realizes is that in many ways what we effectively need is to awaken in our minds key elements of ICU care that we used to endorse long ago, but which were lost and are now reentering our practice some 50 years later. (87) This degree of change mandates a great degree of humility and openness to the fact that we are part of the patients’ problem in and following the ICU.

Next Steps and Future Directions

Advances in our knowledge must continue to be made in many areas. For example, what is the optimal pharmacologic strategy to sedate agitated older patients or those with baseline deficits in neuropsychological function? (88) Bridging between overlapping areas of the PAD (15) and sepsis (89) guidelines has finally occurred (e.g., the “B” of the ABCDEFs appears in both guidelines as a Grade A recommendation). Moving forward, it would be appropriate to use the new Sepsis-3 definitions (90, 91) to determine the relative benefit of ICU Liberation for those with and without sepsis. The ability to conduct both QI projects and dissemination and implementation research globally must expand via more language availability of the spectrum of tools and information available on highly trafficked websites (www.iculiberation.org and www.icudelirium.org). Delirium assessment tools are already present in more than 30 languages, yet the other elements of the ABCDEF bundle could be adapted for use in under-resourced areas and studied. There is need for more in-depth qualitative study of critical care’s shift from a strict focus on pathophysiology and resuscitation to those aspects of ICU-medicine such as long-term physical, emotional, and

cognitive rehabilitation plus psychologically sensitive aspects of personhood explored in the ICU adaption of Maslow's hierarchy of needs.(92) Lastly, we need a greater understanding of the role of Post-ICU Clinics.(93–95)

Concluding Thoughts

Andrew Wyeth's painting, "Christina's World," carries the enduring message of Christina Olson and her perseverance despite great adversity brought on by a severe neuromuscular disease variant of Charcot-Marie-Tooth. It is a wake-up call that Christina Olson's main recollection of her medical evaluations in Boston in the early 1900s was that the teams of doctors were so focused on the academics of making the diagnosis that they completely overlooked her as a person. I know I have done the same thing. The body of literature over the past 20 years that has been used to build the ABCDEF bundle and the ICU Liberation collaborative will help us avoid this pitfall in moving forward.

The most productive aspect of the philosophy of ICU Liberation for us as clinicians is that it shifts our focus from the monitors, beeps and buzzers to a human connection. The holistic approach to ICU Liberation also includes providing a comfortable and dignified dying process via early use of palliative care for our patients who will not be able to survive their critical illness. SCCM's ICU Liberation is about magnifying human dignity and helping to preserve self-worth in patients who during the course of critical illness feel threats to both.

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ICU Liberation Hospitals and Regions

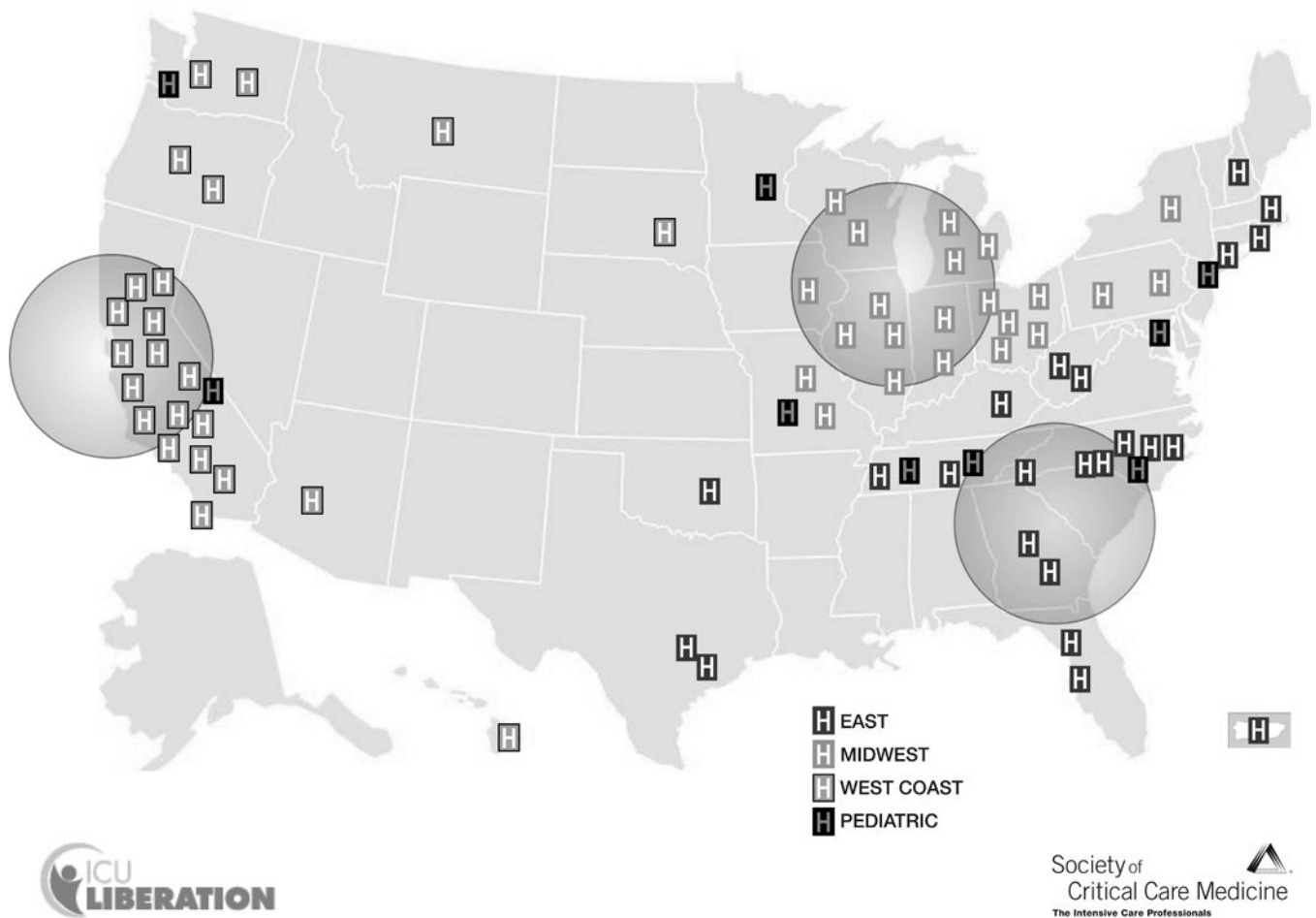


Figure 1. ICU Liberation Map of United States Zones and Participating Hospitals

Map of the United States showing the 3 zones of SCCM's ICU Liberation Collaborative and the locations of 67 adult and 9 pediatric hospitals (n=76) participating in this large-scale quality improvement initiative using the ABCDEF Bundle to implement the PAD Guidelines.



ICU Liberation: ABCDEF Bundle

Symptoms Pain, Agitation, Delirium Guidelines	Monitoring Tools	Care ABCDEF Bundle	Done
Pain	Critical-Care Pain Observation Tool (CPOT) NRS Numeric Rating Scale BPS Behavioral Pain Scale	A: Assess, Prevent and Manage Pain	<input type="checkbox"/>
Agitation	Richmond Agitation-Sedation Scale (RASS) Sedation-Agitation Scale (SAS)	B: Both Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT) C: Choice of Analgesia and Sedation	<input type="checkbox"/> <input type="checkbox"/>
Delirium	Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) Intensive Care Delirium Screening Checklist (ICDSC)	D: Delirium: Assess, Prevent and Manage E: Early Mobility and Exercise F: Family Engagement and Empowerment	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Figure 2. ICU Liberation Schematic Depicting Symptoms, Monitoring Tools, and ABCDEF Rounding Checklist

ICU Liberation is a quality improvement program geared towards reducing symptoms of pain, agitation, and delirium (PAD) that threaten patients’ sense of self-worth and dignity. These symptoms of suffering are monitored using valid and reliable tools, and the culture is shaped using the evidence-based ABCDEF bundle as a rounding checklist. These concepts are based on hundreds of peer-reviewed studies including over 30 from JAMA, Lancet, and NEJM.





Figure 3. Visual Examples Over Time of Early Mobility in Mechanically Ventilated ICU Patients

A. San Francisco General in 1970 (*left*) – Mobilizing an intubated ICU patient with primitive equipment. After this period of early mobilization in the ICU, there was a progressive move away from awake and ambulatory patients while on the ventilator towards heavily sedated and restrained patients for days on end to help prevent awareness and reduce memories of ICU stay. (Courtesy of Heidi Engel PT, DPT and Michael Gropper, MD with permission from the patient and institution)

B. University of California San Francisco (UCSF) in 2015 (middle) – Mobilizing an intubated patient with advanced equipment including monitors and pumps. This patient provides a visual example of the incorporation of ICU Liberation and the ABCDEF bundle within the same city as Fig. A yet 45 years later, following the ongoing renaissance of ICU mobilization. She serves to counter the idea that only simple patients should be ambulated. This 54 year old woman had acute myelogenous leukemia with chronic graft versus host disease and emphysema. She presented with acute on chronic hypoxemic and hypercarbic respiratory failure. Once on mechanical ventilation, she began ambulating to the edge of the bed on day 2 with family to reassure and calm her. On day 3, she transferred to chair standing with moderate assist, and on day 4 took a short walk on the ventilator, which then grew progressively longer on subsequent days (100 to 500 feet), when she was successfully extubated after a week on the ventilator. In the stepdown unit (think “LTAC”), where sometimes patients regress because things are relaxed in comparison to actively “mobile” ICUs, the family advocated for daily ambulation based on their ICU experiences with her. She was discharged home on day 12 with a home-health physical therapy program, where she continues to be functionally independent. Her survival and independence were not

expected by the ICU physicians. (Photo courtesy of Heidi Engel PT, DPT with permission from the patient and institution)

C. ICU Patient and Her Husband Walking with Shopping Cart at the Pomeranian Medical University in Szczecin, Poland 2016 (right) – Globally there is a wide range of approaches to early mobilization adapting the ICU Liberation concepts to local resources and cultures. (Courtesy of Katarzyna Kotfis, MD with permission from the patient and institution)

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