

ORGANIZATIONAL DOMAINS AND VARIATION IN ATTITUDES OF INTENSIVE CARE PROVIDERS TOWARD THE ABCDE BUNDLE

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Background The ABCDE interprofessional bundle (Awakening and Breathing Coordination, Delirium monitoring and management, and Early mobility) reduces delirium and weakness in critically ill patients.

Objective To understand the relationship between organizational domains and provider attitudes.

Methods A 1-time electronic survey of 315 care providers in 10 intensive care units across the country to examine associations between organizational domains (policy/protocol factors, unit milieu, tasks, labor quality, labor quantity, and physical environment) and provider attitudes about perceived ease of completion, perceived safety, confidence, and perceived strength of evidence regarding the ABCDE bundle. Spearman correlations (r_s) were used to examine the associations between organizational domains and provider attitude subscales ($r_s \geq 0.32$ was considered clinically important).

Results Protocol attributes ($r_s = 0.37$ -0.58), role clarity ($r_s = 0.38$ -0.59), training/understanding ($r_s = 0.33$ -0.46), coordination ($r_s = 0.32$ -0.46), and peer advocates ($r_s = 0.37$ -0.48) were associated with less difficulty performing the bundle and better confidence, perceived safety, and strength of evidence. Participants also reported less difficulty carrying out the bundle when the team worked well together. Task autonomy was associated with better perceived safety ($r_s = 0.35$) and confidence ($r_s = 0.47$) related to the bundle.

Conclusions Focusing interventions on policy and protocol factors, unit milieu, and task autonomy, which have the strongest associations with providers' attitudes, may facilitate ABCDE bundle uptake. (*American Journal of Critical Care*. 2017;26:e18-e28)

CE 1.0 Hour

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doi:<https://doi.org/10.4037/ajcc2017297>

Critical illness and the use of sedatives during mechanical ventilation can lead to delirium and intensive care unit (ICU)-acquired weakness.¹ The ABCDE bundle (Awakening and Breathing Coordination, Delirium monitoring and management, and Early mobility) is an interprofessional, multicomponent, evidence-based process designed to break the cycle of oversedation and prolonged mechanical ventilation leading to delirium and ICU-acquired weakness. More importantly, the bundle is designed to reduce patients' suffering by providing care that increases the likelihood of survival and return to baseline physical and cognitive function.² Use of the ABCDE bundle has resulted in reductions in delirium, duration of mechanical ventilation, and hospital days.³⁻⁵ In addition, the ABCDE bundle increases the frequency of early mobilization during critical illness and reduces costs.³⁻⁵

Despite evidence for use of the bundle, research suggests limited uptake of the ABCDE components. In a survey⁶ of 212 providers, only 12% reported implementation of routine spontaneous awakening trials, delirium assessment, and early mobility. Less than half the respondents achieved the outcome measure of having more than 75% of ventilator patients undergoing daily awakening trials and delirium assessment. Likewise, early mobility was reported as an active unit goal by only 65% of respondents. Policy and protocol factors (protocol clarity/complexity, role clarity, training and understanding), unit milieu (staff morale, respect across disciplines, coordination, ICU/organizational culture, peer advocates), tasks (workload, documentation,

autonomy), labor quality (provider competence, experience, knowledge) and labor quantity (staff turnover, staff type [eg, float pool]), and physical environment (structural ICU characteristics, electronic medical record, equipment) are factors that affect implementation of the ABCDE bundle.⁷⁻⁹ However, multicenter data regarding organizational domains that affect the provider's attitude (ie, internal disposition) to execute the ABCDE bundle are limited.

Identifying factors that affect providers' attitudes and ABCDE bundle implementation in different ICU settings may guide further targeted interventions to improve use of the bundle.

The ABCDE bundle increases the likelihood of survival and return to baseline function.

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Objectives

The objective of this study was to examine the associations of selected organizational domains of (a) policy/protocol factors (protocol attributes, role clarity, training, and understanding), (b) unit milieu (coordination, peer advocates, teamwork), (c) tasks (autonomy, time demands), (d) labor quality (competence), (e) labor quantity (sufficient staff, type of staff), and (f) physical environment (unit layout, access to supplies and equipment) with provider attitudes of (a) perceived ease of completion, (b) perceived safety, (c) confidence, and (d) perceived strength of evidence regarding the ABCDE bundle.

Methods

This 1-time cross-sectional survey was conducted as part of a multicenter, prospective cohort pilot study funded by an American Association of Critical-Care Nurses Sigma Theta Tau critical care grant. Study approval was obtained from the Vanderbilt

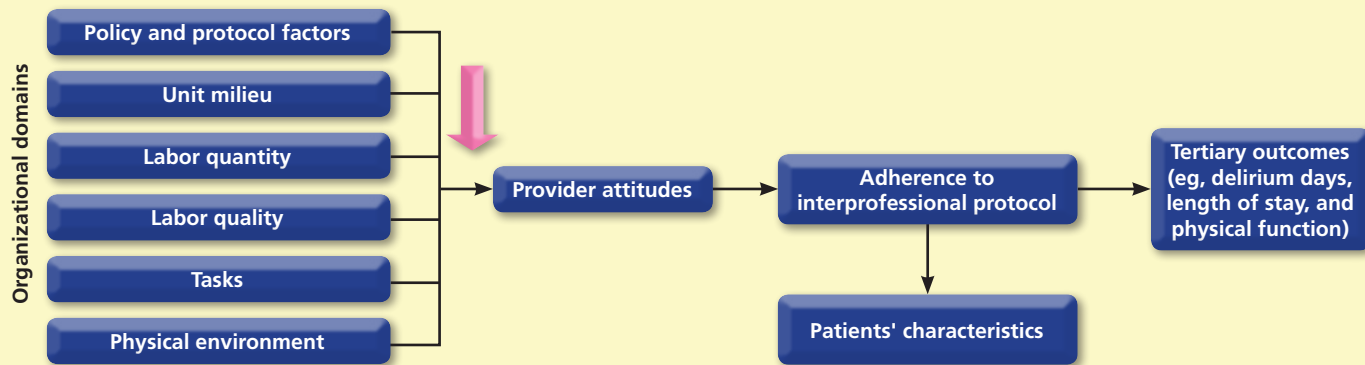


Figure 1 Conceptual framework for interprofessional bundle implementation.

University institutional review board and the institutional review board of each participating site. A waiver of documentation of informed consent was obtained for administration of the anonymous survey to ICU providers. Financial incentives for recruitment were not available.

Setting and Sample

Vanderbilt University was the coordinating center for the study. Participants were recruited from 10 participating medical and surgical ICUs at the following hospitals: Baystate Medical Center (Springfield, Massachusetts), Vanderbilt University Hospital (Nashville, Tennessee), University Hospital San Antonio (San Antonio, Texas), Harborview Medical Center (Seattle, Washington), University of Maryland Medical Center (Baltimore, Maryland), and University of Michigan Health System (Ann Arbor,

Michigan). Registered nurses, physical therapists (PT), occupational therapists (OT), respiratory therapists (RT), pharmacists, advanced practice nurses, nursing leaders, and physicians working at least 4 shifts per month were eligible for study participation.

Conceptual Framework

The principal investigator (L.M.B.) reviewed the literature and, along with coinvestigator (L.C.M.), devised a conceptual framework a priori that was a modification of the health services Outcome Production Model (Figure 1).^{10,11} Through previous study, this framework adequately revealed organizational domains to describe provider variation and underuse of the ABCDE bundle.¹² The pink arrow in Figure 1 signifies the associations under investigation in the current study.

Variables and Measures

A 71-item electronic ABCDE provider survey was generated specifically for this study. Data from a review of the literature and 2 single-center interprofessional focus group sessions (n = 16) conducted by the principal investigator informed the survey.¹² Focus group data were coded with affinity diagramming, resulting in 7 constructs: policy and protocol factors, unit milieu, physical environment, labor quality, labor quantity, tasks, and provider attitudes. Survey questions were developed by the investigators for the collection of data on the 7 identified constructs in relation to execution of the ABCDE bundle and individual components. All responses used a 10-point visual analog scale with higher scores indicating more positive views. The survey contained 7 demographic questions (eg, age, experience, education level) and 1 open-ended question for respondents to share any additional thoughts they had regarding barriers and facilitators to implementing the ABCDE bundle. Content validation (scale-level content validity index = 0.96, $P = .05$) was conducted according to the Lynn method using a 9-person expert panel.¹³ The panel comprised 3 physicians, 3 registered nurses, 1 advanced practice nurse, 1 PT, and 1 pharmacist all having at least 2 years of ICU experience and familiarity with the ABCDE bundle. Feasibility testing demonstrated that the survey took between 5 and 7 minutes to complete. Multidisciplinary pilot testing revealed minimal nonresponse potential for individual items. The Cronbach α for the overall ABCDE provider survey was 0.95.

The majority of organizational domain and provider attitude responses were grouped into subscale themes for ease of comparison. Mean scores were calculated for each of the subscales. The remaining domains were analyzed as single items. Descriptions of subscales and items are provided in Table 1. Specific questions with corresponding visual analog scale anchors are available as a Supplement.

Nurses; physical, occupational, and respiratory therapists; pharmacists; advanced practice nurses; and physicians were surveyed.

Table 1
Subscales and items of survey

Domain	Subscale and factors
Policy and protocol	Protocol attributes (ie, accessibility, clarity, and complexity: 13 items, $\alpha=0.90$) Provider role clarity (ie, clarity of own and others' roles: 8 items, $\alpha=0.84$) ABCDE bundle training and understanding (2 items, $\alpha=0.57$)
Unit milieu	Coordination among disciplines (4 items, $\alpha=0.58$) ABCDE bundle advocates (eg, physician/nurse leadership, peer leaders: 3 items, $\alpha=0.59$) Intensive care unit clinician teamwork (4 items, $\alpha=0.02$)
Tasks	Time demands and having enough time (5 items, $\alpha=0.78$) Autonomy (4 items, $\alpha=0.70$)
Labor quality	Provider competence (6 single items)
Labor quantity	Sufficient staffing (1 item)
Physical environment	Unit layout and access to supplies (2 single items)
Provider attitudes (ie, internal disposition and way of thinking)	Perceived ease of ABCDE bundle completion (2 items, $\alpha=0.16$) Perceived safety of ABCDE bundle completion (4 items, $\alpha=0.73$) Confidence with performing the ABCDE bundle (4 items, $\alpha=0.69$) Perceived strength of evidence with the ABCDE bundle (5 items, $\alpha=0.86$)

Procedures

The principal investigator (L.M.B.) personally visited each site to meet one-on-one with the leader of each unit and department at participating hospitals to determine strategies for survey distribution and completion. Eligibility for participation in the study was reviewed, and determinations were made for site-specific methods to reach the target sample while also minimizing sampling error. For example, the nurse manager from one site forwarded the survey using an e-mail distribution list including just full- and part-time nurses working in the unit, excluding temporary personnel. Another site's respiratory and physical therapy managers forwarded the survey invitation only to those therapists working in eligible unit(s). Leaders forwarded an electronic survey link to the targeted sample population. Reminders were sent at 4 and 8 weeks to maximize survey response rates. Unit signage and recruitment postcards were employed across sites to enhance participation. Study data were collected and managed by using Research Electronic Data Capture (REDCap) tools hosted at Vanderbilt University.¹⁴

Statistical Analysis

IBM SPSS version 23 was used for all statistical analyses. Graphical and descriptive statistical methods were used to evaluate data distributions. Frequency distributions were used to summarize nominal and ordinal data. Continuous data distributions were skewed; therefore, medians and interquartile ranges were used to summarize those data. No data transformations were necessary to meet statistical assumptions. Individual survey items were evaluated for systematic nonresponse patterns for the entire sample and within each discipline to

determine if data were missing randomly or nonrandomly.¹⁵ No survey items were omitted from analyses. Spearman correlations (r_s) were used to assess the associations of the selected organizational domains with provider attitudes. Because of very low Cronbach α values, individual items for teamwork and perceived ease of completion were correlated rather than subscale values. Tests of statistical significance maintained a type I error rate of .05 ($P<.05$). Because of the large sample size, even very small associations would be statistically significant. To limit the possibility of overinterpreting the findings on the basis of statistical significance alone, we used an a priori minimal level of association (effect size) equal to 0.32. A squared coefficient of this magnitude or larger represents at least 10% shared variance between 2 variables.¹⁶

Results

A total of 315 surveys were included in the analysis (69 were excluded for ineligible unit or <4 survey items completed), a response rate of 25%. A descriptive summary of participants is presented in Table 2. Nurses and physicians comprised the largest proportion of the sample, 156 nurses (50%) and 73 physicians (23%). Participants had a median age of 38 years (interquartile range [IQR], 31-49 years), had 9 years of ICU experience (IQR, 4-19 years), and 53% ($n = 168$) were female. RTs tended to be older (median age, 50 years; IQR, 43-57 years) and more experienced (median, 18 years; IQR, 9-25

More autonomy with the ABCDE bundle was associated with greater confidence and perceived safety.

Table 2
Demographics of the multisite sample

Characteristic	Age, median (IQR)	Female sex, No. (%)	ICU experience, median (IQR), y
Position			
Nurse (n=156)	36 (28-45)	108 (69)	9 (4-19)
Nurse practitioner (n=8)	34 (30-40)	5 (62)	8 (5-13)
Occupational therapist (n=7)	30 (27-44)	5 (71)	6 (3-21)
Pharmacist (n=9)	34 (31-64)	4 (44)	9 (6-32)
Physical therapist (n=21)	31 (28-37)	14 (67)	7 (3-10)
Physician (n=73)	40 (35-46)	17 (23)	9 (4-15)
Respiratory therapist (n=41)	50 (43-57)	15 (37)	18 (9-25)
Total sample (N=315)	38 (31-49)	168 (53)	9 (4-19)

Abbreviations: ICU, intensive care unit; IQR, interquartile range.

years). Descriptive summaries of provider attitude subscales are presented in Table 3. On a 10-point scale, participants tended to disagree with the statement that the ABCDE bundle was difficult to carry out (median score, 4.0; IQR, 2.0-5.9) but were neutral on impact to workload (median score, 5.2; IQR, 2.8-7.0). They agreed the bundle has strong supporting evidence (median score, 9.4; IQR, 8.3-9.9). Last, the bundle was perceived as safe to execute (median score, 8.8; IQR, 7.8-9.6) with a relatively high level of confidence (median score, 8.6; IQR, 7.0-9.5).

Association of Provider Attitudes With Organizational Domains

Correlations of organizational variables with provider attitudes are summarized in Table 4. A majority of the correlations were statistically significant ($P < .05$), with one-third as clinically meaningful ($r_s \geq 0.32$). Perceived ease of completion via workload burden assessment was not clinically significantly associated with any organizational domain. Absolute values of clinically important correlations were found for provider attitudes about ABCDE bundle difficulty, perceived safety, confidence, and perceived strength of evidence with policy and protocol factors (ie, protocol attributes [$r_s = 0.37$ - 0.58], role clarity [$r_s = 0.38$ - 0.59], training and understanding [$r_s = 0.33$ - 0.46]) and with unit milieu (coordination [$r_s = 0.33$ - 0.45] and peer advocates [$r_s = 0.32$ - 0.48]). Provider attitudes about bundle difficulty, confidence, and perceived strength of evidence were correlated with teamwork (work well together [$r_s = 0.36$ - 0.44], help each other [$r_s = 0.33$ - 0.41]). In addition, ABCDE bundle perceived safety ($r_s = 0.35$) and confidence ($r_s = 0.47$) were correlated with providers' reports of task autonomy. The labor quality (ie, competence) of pharmacists and physicians was associated with perceived safety ($r_s = 0.39$).

Table 3
Provider attitude scores from responses on the visual analog scale (N = 222-269)^a

Question	Median VAS score ^b	IQR
Perceived EASE of Completion of the ABCDE bundle ($\alpha = 0.16$)		
The bundle greatly increases my WORKLOAD (0-10 strongly [dis]agree)	5.2	2.8-7.0
The team has DIFFICULTY carrying out the bundle (0-10 strongly [dis]agree)	4.0	2.0-5.9
Perceived SAFETY of the ABCDE bundle ($\alpha = 0.73$)	8.8	7.8-9.6
Spontaneous awakening trial (hazardous 0, safe 10)	9.4	7.9-10.0
Spontaneous breathing trial (hazardous 0, safe 10)	9.6	8.4-10.0
Delirium assessment/management (hazardous 0, safe 10)	9.8	8.6-10.0
Early mobility (hazardous 0, safe 10)	8.0	6.1-9.6
CONFIDENCE in performing the ABCDE bundle ($\alpha = 0.69$)	8.6	7.0-9.5
Spontaneous awakening trial (uncertain 0, confident 10)	9.6	7.4-10.0
Spontaneous breathing trial (uncertain 0, confident 10)	9.7	7.8-10.0
Delirium assessment/management (uncertain 0, confident 10)	9.0	7.3-10.0
Early mobility (uncertain 0, confident 10)	8.0	6.0-9.8
Perceived STRENGTH OF EVIDENCE of the ABCDE bundle ($\alpha = 0.86$)	9.4	8.3-9.9
Importance of completing the ABCDE bundle (not important 0, important 10)	8.9	7.1-10.0
The literature strongly supports SATs (0-10 strongly [dis]agree)	9.8	8.8-10.0
The literature strongly supports SBTs (0-10 strongly [dis]agree)	9.8	8.9-10.0
The literature strongly supports delirium assessment/management (0-10 strongly [dis]agree)	9.8	8.5-10.0
The literature strongly supports early mobility (0-10 strongly [dis]agree)	9.8	8.4-10.0

Abbreviations: ABCDE, awakening and breathing trial, coordination, delirium assessment/management, early mobility; SAT, spontaneous awakening trial; SBT, spontaneous breathing trial; VAS, visual analog scale.

^a All subscale totals are in bold.

^b Range of scores on VAS, 0-10; higher values indicate more positive attitudes for most items.

Table 4
Association of organizational domains and provider attitude subscales (N=220-269)

Organizational domains	Provider attitudes (r_s) ^a				
	Perceived ease of completion		Perceived safety	Confidence	Perceived strength of evidence
	Workload	Difficulty			
Policy and protocol factors					
Protocol accessibility, clarity, complexity	-0.06	-0.37^b	0.44^b	0.58^b	0.44^b
Role clarity	-0.06	-0.38^b	0.42^b	0.59^b	0.46^b
Training and understanding	0.02	-0.22 ^b	0.33^b	0.46^b	0.40^b
Unit milieu					
Coordination	0.03	-0.33^b	0.33^b	0.45^b	0.38^b
Peer advocates	0.01	-0.32^b	0.37^b	0.31 ^b	0.48^b
Intensive care unit teamwork					
Work well together	-0.02	-0.44^b	0.29 ^b	0.36^b	0.36^b
Help each other	0.25 ^b	0.41^b	-0.27 ^b	-0.30 ^b	-0.33^b
Rely on each other	0.23 ^b	0.22 ^b	0.17 ^b	0.14 ^c	0.10
Workload not fairly shared	0.10	0.26 ^b	-0.02	0.03	-0.02
Tasks					
Time demands	-0.17 ^c	-0.25 ^b	0.28 ^b	0.14 ^c	0.27 ^b
Autonomy	-0.08	-0.15 ^c	0.35^b	0.47^b	0.31 ^b
Labor quality (ie, competence)					
Nurses	-0.10	-0.26 ^b	0.29 ^b	0.28 ^b	0.33^b
Occupational therapists	-0.02	-0.16 ^c	0.16 ^c	0.19 ^c	0.29 ^b
Pharmacists	-0.13	-0.29 ^b	0.39^b	0.28 ^b	0.46^b
Physical therapists	-0.00	-0.17 ^b	0.23 ^b	0.25 ^b	0.29 ^b
Physicians	-0.23 ^b	-0.25 ^b	0.39^b	0.25 ^b	0.38^b
Respiratory therapists	-0.18 ^b	-0.30 ^b	0.30 ^b	0.31 ^b	0.38^b
Labor quantity	-0.08	-0.29 ^b	0.22 ^b	0.18 ^c	0.16 ^c
Physical environment					
Unit layout	-0.01	-0.32^b	0.28 ^b	0.18 ^c	0.40^b
Access to supplies and equipment	-0.01	-0.37^b	0.24 ^b	0.27 ^b	0.29 ^b

Abbreviations: r_s , Spearman correlation.

^a Bolded values are clinically significant at $r_s \geq 0.32$, accounting for $\geq 10\%$ of variance.

^b $P < .001$.

^c $P < .05$.

and perceived strength of evidence ($r_s = 0.38$ - 0.46), whereas nurse and RT labor quality was associated just with perceived strength of evidence ($r_s = 0.33$ - 0.38). Unit layout was associated with bundle difficulty ($r_s = 0.32$) and perceived strength of evidence ($r_s = 0.40$). Last, bundle difficulty was associated with access to supplies ($r_s = -0.37$).

Discussion

As a first step in examining methods for intervention to enhance ABCDE bundle adherence, we examined selected organizational domains that may influence provider attitudes. We found that the more (1) straightforward the role of providers; (2) clear, accessible, and simple the protocol; (3) training and understanding; and (4) provider autonomy, the more likely that providers are to feel safe and confident with ABCDE bundle implementation.

Notably, 35% of the variability in provider confidence performing the ABCDE bundle was explained by role clarity. Next, protocol attributes such as accessibility, clarity, and complexity explained 19% to 34% of the variability in provider confidence, perceived safety, and perceived strength of ABCDE bundle evidence, but only 14% of perceived difficulty. Likewise, 21% of variation in provider-reported confidence using the ABCDE bundle was explained by training and understanding. Perception of team members' working together and willingness to help one another explained 17% to 19% of difficulty performing the ABCDE bundle. Finally, reported level of provider autonomy explained 12% of the variation in provider attitudes about perceived safety of the ABCDE bundle and 22% of the variation in provider confidence in performing ABCDE bundle activities. Given that these were the

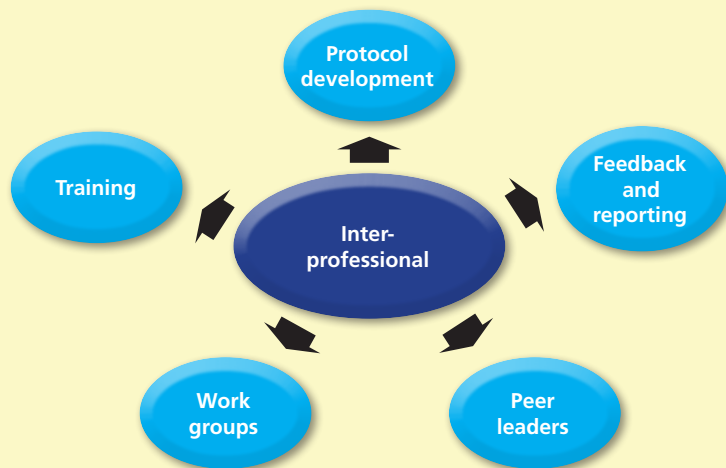


Figure 2 Suggested components for targeted interprofessional interventions to facilitate implementation and maintenance of ABCDE bundle.

most clinically important organizational domains found to explain variation in provider attitudes, they are a reasonable starting point for examining methods for intervention to enhance ABCDE bundle adherence.

Our findings are consistent with the study's guiding conceptual framework as well as previous findings in studies of ABCDE bundle implementation.^{7-9,12} Although researchers in previous studies did not evaluate the influence of organizational domains on provider attitudes toward the ABCDE

bundle, they have identified similar organizational domains serving as barriers to ABCDE bundle implementation. Key findings affirming our results include timing of awakening and breathing trials (ie, protocol clarity), knowledge deficits (ie, training and understanding), coordination and communication

challenges, unclear protocols, and absence of peer advocates identified as implementation barriers.⁷⁻⁹ Furthermore, our findings are supported by implementation studies of other interprofessional protocols identifying policy and protocol factors such as unclear role responsibilities, timing for protocol completion, and challenges learning complex protocols as barriers to successful implementation.^{17,18}

Through the survey, we obtained multidisciplinary input for providers' perspectives on the perceived competence of other ICU professionals (ie, labor quality). With the exception of PTs and OTs, perceived competence of the remaining ICU providers was clinically significantly associated with provider attitudes about strength of evidence with the

ABCDE bundle, explaining 11% to 21% of the variance. Critical care expertise and clinical experience have been attributed as moderators of interprofessional protocol adherence in prior work and warrant further evaluation in relation to ABCDE bundle adherence.¹⁹⁻²¹ PTs and OTs in participating hospitals are part of a centralized staffing structure and, thus, may not rotate through consistent units. Less consistency in PT and OT staffing is reported to be associated with therapist difficulties because the therapists have limited or no expertise with some patient populations.^{22,23} Distributing PT and OT staff with compatible expertise into clustered service areas (eg, surgical ICU and surgical step-down unit) may reduce variance in care as well as improve familiarity and interprofessional experiences among the different ICU providers.^{22,23}

We identified further evidence of role clarity problems from the pattern of missing data associated with particular professions. PTs and OTs tended to have missing responses for questions related to awakening and breathing coordination, delirium assessment and management, and the complete ABCDE bundle. Similarly, RTs tended to consistently have missing responses for questions related to spontaneous awakening trials, delirium assessment and management, early mobility, and the complete ABCDE bundle. Perhaps these providers see themselves outside of the interprofessional team or protocol because they come from centralized departments rather than decentralized ICU staffing. Subsequently, PTs, OTs, and RTs may be less involved in ICU protocol development and not as well integrated into implementation processes, contributing to loss of a team mentality. Clear articulation of each provider's role can foster ownership and promote smooth team functioning, allowing team members to complete the ABCDE bundle amidst a chaotic ICU environment.²⁴ Likewise, use of a unified ABCDE protocol, as opposed to separate protocols for each component of the bundle, may improve interprofessional role clarity and, thus, providers' attitudes toward the ABCDE bundle.

The clinical implications of this study lie in the potential for interprofessional collaboration that may improve providers' attitudes and implementation of the ABCDE bundle (Figure 2). First, interprofessional work groups may be indicated for protocol development and implementation to increase confidence in conducting the ABCDE bundle by clarifying protocol attributes and providers' roles. Second, strong interprofessional peer leaders are necessary for successful daily execution of the

Interprofessional work groups are indicated for ABCDE protocol development and implementation.

ABCDE bundle, especially when unit culture has not yet adapted.⁹ Next, unit culture change and interprofessional engagement may be fostered through structured feedback and reporting of ABCDE metrics and associated outcomes.⁹ Last, the implementation process may benefit from the inclusion of interprofessional education and training opportunities to improve ABCDE bundle role clarity, understanding, and coordination. Access and exposure to publications about the ABCDE bundle that may influence providers' attitudes of perceived strength of evidence most likely vary across professions. Interprofessional journal clubs may be considered as another method for disseminating ABCDE evidence and enhancing understanding.

This study has important limitations that must be addressed. First, participation in the online survey was low. We used ICU leaders and peer leaders to foster participation; however, there is the potential for bias due to participation motivated by those who are strongly for or against the ABCDE bundle. Second, the study was a cross-sectional single-survey design. Variance in exposure to the ABCDE bundle at each of the participating centers is likely, and we are unable to infer causality of organizational domains with respect to providers' attitudes regarding ABCDE bundle ease of completion, safety, confidence, and strength of evidence. Last, the subscales for perceived ease of completion and teamwork had low internal consistency. Modification of these items is required before future study.

Despite its limitations, the study also has important strengths. The study includes multidisciplinary participation of physicians, nurses, advanced practice nurses, pharmacists, PTs, OTs, and RTs with a sample size that is greater than prior studies of barriers to and facilitators of the ABCDE bundle. Although some disciplines had fewer participants (eg, OTs, pharmacists, nurse practitioners), this sample is representative of the staffing ratios represented within the participating ICUs. The study also incorporated providers from 10 different medical and surgical ICUs in 6 different hospitals across the continental United States. Although the generalizability of the findings may be limited, we were able to identify several organizational domains amenable to intervention that can be studied on a larger scale.

Conclusions

In this study, we found a number of organizational domains that are positively associated with providers' attitudes about ABCDE bundle difficulty, perceived safety, confidence, and perceived strength

of evidence. We identified issues with role clarity and labor quality across professions. Implementation of the ABCDE bundle is dependent on successful interprofessional collaboration. Although nurses are uniquely qualified because of their participation in each component of the ABCDE bundle, other members of the interprofessional team are equally important for achieving success. Future research efforts would benefit from a larger sample of PTs, OTs, RTs, and pharmacists. Likewise, exploration of the relationship between providers' attitudes and execution of the ABCDE bundle is indicated.

FINANCIAL DISCLOSURES

This research project was supported by the AACN-Sigma Theta Tau Critical Care grant (20170) and the Vanderbilt Institute for Clinical and Translational Research (UL1 TR000445 from the National Center for Advancing Translational Sciences/National Institutes of Health [NIH]). Dr Vasilevskis is supported by the NIH (K23AG040157) and the Geriatric Research, Education and Clinical Center (GRECC). Drs Ely and Pandharipande are supported by the NIH (AG027472, HL111111, AG035117, AG034257) and the Veterans Affairs Clinical Science Research and Development Service. Dr Ely is supported by GRECC.

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CE 1.0 Hour Category A

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Policy and Protocol Factors

Protocol Attributes (13 items, $\alpha=0.90$)

- Obtaining ACCESS to your protocol/procedure for SAT is (*difficult 0 → easy 10*)
- Obtaining ACCESS to your protocol/procedure for SBT is (*difficult 0 → easy 10*)
- Obtaining ACCESS to your protocol/procedure for Delirium assessment/management is (*difficult 0 → easy 10*)
- Obtaining ACCESS to your protocol/procedure for Early mobility is (*difficult 0 → easy 10*)
- Obtaining ACCESS to your protocol/procedure for the ABCDE bundle is (*difficult 0 → easy 10*)
- The protocol/procedure for SAT is (*complex 0 → simple 10*)
- The protocol/procedure for SBT is (*complex 0 → simple 10*)
- The protocol/procedure for Delirium assessment/management is (*complex 0 → simple 10*)
- The protocol/procedure for Early mobility is (*complex 0 → simple 10*)
- The TIME of DAY designated to perform the SAT is (*unclear 0 → clear 10*)
- The TIME of DAY designated to perform the SBT is (*unclear 0 → clear 10*)
- The TIME of DAY designated to perform the Delirium assessment/management is (*unclear 0 → clear 10*)
- The TIME of DAY designated to perform the Early mobility is (*unclear 0 → clear 10*)

Provider Role Clarity (8 items, $\alpha=0.84$)

- My role in performing the SAT is (*unclear 0 → clear 10*)
- My role in performing the SBT is (*unclear 0 → clear 10*)
- My role in performing Delirium monitoring/management is (*unclear 0 → clear 10*)
- My role in performing Early mobility is (*unclear 0 → clear 10*)
- The role of other disciplines in performing the SAT is (*unclear 0 → clear 10*)
- The role of other disciplines in performing the SBT is (*unclear 0 → clear 10*)
- The role of other disciplines in performing Delirium assessment/management is (*unclear 0 → clear 10*)
- The role of other disciplines in performing Early mobility is (*unclear 0 → clear 10*)

ABCDE bundle training and understanding (2 items, $\alpha=0.57$)

- I have an excellent understanding of how to use all the parts of the ABCDE bundle (*strongly disagree 0 → strongly agree 10*)
- I was provided with detailed communication and training on ally of the ABCDE protocol/procedures (*strongly disagree 0 → strongly agree 10*)

Unit Milieu

Coordination among disciplines (4 items, $\alpha=0.58$)

- Coordination with other disciplines for Awakening and Breathing trial Coordination is (*difficult 0 → easy 10*)
- Coordination with other disciplines for Delirium management is (*difficult 0 → easy 10*)
- Coordination with other disciplines for Early mobility is (*difficult 0 → easy 10*)
- Conducting the ABCDE bundle requires a great deal of communication and coordination among disciplines in the ICU (*strongly disagree 0 → strongly agree 10*)

ABCDE bundle advocates (3 items, $\alpha=0.59$)

- The nurse leadership of my unit places high value on doing the ABCDE bundle (*strongly disagree 0 → strongly agree 10*)
- The physicians on my unit place high value on doing the ABCDE bundle (*strongly disagree 0 → strongly agree 10*)
- My unit has a peer leader(s) (aka, unit champion, unit expert) who advocates for the use of the ABCDE bundle (*strongly disagree 0 → strongly agree 10*)

ICU clinician teamwork (4 items, $\alpha=0.02$)

- In completing parts of the ABCDE bundle, our ICU multidisciplinary team works well together (*strongly disagree 0 → strongly agree 10*)
- Members of the ICU team have their own individual jobs and typically do not help each other (*strongly disagree 0 → strongly agree 10*)
- Clinicians within the ICU have to depend heavily on one another to get the ABCDE bundle completed (*strongly disagree 0 → strongly agree 10*)
- Some clinicians on our ICU team do not carry a fair share of the ABCDE bundle workload (*strongly disagree 0 → strongly agree 10*)

Tasks

Time demands and having enough time (5 items, $\alpha=0.78$)

- Think of the last 3 shifts you worked. To what degree did patients transporting off the unit (e.g., CT scan, MRI) affect your ability to perform the ABCDE bundle (*often 0 → never 10*)
- Think of the last 3 shifts you worked. To what degree did critical events (e.g., code) affect your ability to perform the ABCDE bundle (*often 0 → never 10*)
- Think of the last 3 shifts you worked. To what degree did patient admissions affect your ability to perform the ABCDE bundle (*often 0 → never 10*)
- Think of the last 3 shifts you worked. To what degree did patient discharges affect your ability to perform the ABCDE bundle (*often 0 → never 10*)
- On average, I have sufficient time to perform the parts of the ABCDE bundle during my shift (*strongly disagree 0 → strongly agree 10*)

Autonomy (4 items, $\alpha=0.70$)

- I have professional autonomy to conduct an SAT independently (*no autonomy 0 → complete autonomy 10*)
- I have professional autonomy to conduct an SBT independently (*no autonomy 0 → complete autonomy 10*)
- I have professional autonomy to conduct Delirium assessment/management independently (*no autonomy 0 → complete autonomy 10*)
- I have professional autonomy to conduct Early mobility independently (*no autonomy 0 → complete autonomy 10*)

Labor Quality (6 items, $\alpha=0.77$)

- My unit is staffed with highly competent critical care nurses (*strongly disagree 0 → strongly agree 10*)
- My unit is staffed with highly competent physicians (*strongly disagree 0 → strongly agree 10*)
- My unit has access to highly competent pharmacists (*strongly disagree 0 → strongly agree 10*)
- My unit has access to highly competent respiratory therapists (*strongly disagree 0 → strongly agree 10*)
- The physical therapists working in my unit have training and experience in the care of critically ill patients (*strongly disagree 0 → strongly agree 10*)
- The occupational therapists working in my unit have training and experience in the care of critically ill patients (*strongly disagree 0 → strongly agree 10*)

Labor Quantity

- The number of staff in my unit makes it easy for me to perform the parts of the ABCDE bundle (*strongly disagree 0 → strongly agree 10*)

Physical Environment (2 items, $\alpha=0.73$)

- The layout of my unit makes it easy for me to perform the parts of the ABCDE bundle (*strongly disagree 0 → strongly agree 10*)
- The supplies or equipment I need to perform parts of the ABCDE bundle are easily accessible (*strongly disagree 0 → strongly agree 10*)

Supplement Organizational domain items for ABCDE provider survey

Abbreviations: CT, computed tomography; ICU, intensive care unit; SAT, spontaneous awakening trial; SBT, spontaneous breathing trial; MRI, magnetic resonance imaging.