

IMPROVING ADHERENCE TO AN INTEGRATED SPONTANEOUS AWAKENING
AND SPONTANEOUS BREATHING TRIAL PROTOCOL

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DISSERTATION

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ABSTRACT

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The University of Texas Southwestern Medical Center, 2023

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Background: Integration of nursing-driven spontaneous awakening trial (SAT) and respiratory therapy-driven spontaneous breathing trial (SBT) protocols for patients on mechanical ventilation in the intensive care unit (ICU) is associated with fewer ventilator days, shorter ICU stays, and reduced hospital length-of-stay [1-3]. However, institutional adherence is often suboptimal due to the complexity and multidisciplinary nature of these integrated protocols. This project aims to describe baseline compliance with our institution's SAT/SBT protocol, identify factors influencing compliance, and increase adherence to the existing SAT/SBT protocol in the ICU to a goal of greater than 95% compliance by August 2023.

Local Problem: Data from a retrospective chart review indicated a SAT screen rate of 63.8% and a SBT screen rate of 85%. Therefore, the SAT/SBT protocol adherence at our institution is sub-optimal.

Methods: Initially, we determined baseline adherence rates through a retrospective chart review of SAT and SBT documentation. Specifically, we identified the rates of correctly performed SAT and SBT screenings for all eligible patients and the subsequent rates of correct SAT and SBT performance for patients who passed the appropriate screening. We then sought to identify factors influencing adherence to the SBT/SAT protocol by employing an ethnographic approach, including: (a) process mapping of the integrated SAT/SBT protocol, (b) literature-driven surveys using the Likert scale to assess potential barriers to protocol adherence, [4] (d) informal interviews with nurses and respiratory therapists, and (e) direct observation in the medical ICU. Individual factors identified were organized using the Systems Engineering Initiative for Patient Safety (SEIPS) sociotechnical framework [5]. The SEIPS model allowed for further design of targeted interventions to improve protocol adherence.

Results: Factors influencing adherence were identified from survey responses by 63 nurses and 26 respiratory therapists, 30 hours of direct observation, and tabulated comments from surveys and informal interviews. Prominent factors influencing

compliance included knowledge of the protocol, protocol variation across intensive care units, accessibility of the protocol, ease of documentation in the electronic medical record (EMR), and the exclusion of nurses and respiratory therapists in physician-led ICU rounds.

Conclusion: Data from a retrospective chart review and ethnographic investigation of SAT/SBT protocols indicated sub-optimal adherence. Further investigation into the specific factors influencing adherence allowed us to propose specific interventions to improve performance. Such future interventions will include: (a) EMR redesign using feedback obtained in our investigation to improve accessibility and allow reliable surveillance of protocol adherence, (b) enhanced, standardized multidisciplinary ICU rounds, (c) protocol education sessions, (d) continuous monitoring of protocol metrics with intermittent feedback provided to staff, and (e) a Quality Assurance and Performance Improvement Workgroup dedicated to regular engagement of key stakeholders for process improvement.

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CHAPTER 1 Introduction

Problem Description

The integration of daily spontaneous awakening trials (SAT) with spontaneous breathing trials (SBT) has long been recognized to improve outcomes for patients on mechanical ventilation. Implementation and ongoing adherence to protocols pairing the two practices, however, have proven challenging. The complex, interdisciplinary environment of an intensive care unit (ICU) introduces several agents that may influence adherence to an integrated SAT and SBT protocol. Tailoring quality interventions to such agents will work to improve protocol adherence and, consequently, outcomes for patients on mechanical ventilation. Data from a retrospective chart review performed at our institution's Medical ICU (Fig.1) indicated a SAT screen rate of 63.8% and a SBT screen rate of 85%. Screening patients is the first step in the processes for SATs and SBTs, therefore suboptimal screening rates highlight the considerable opportunity for improvement in SAT/SBT protocol adherence at our institution.

Available Knowledge

Spontaneous awakening trials, also known as "sedation vacations," refer to the daily interruption of medications used for sedation. Each SAT consist of a screening of various contraindications conducted by registered nurses. If the patient passes the screening, the nurse halts the infusion of any medication used for sedation and monitors the patient's level of consciousness to assess whether the patient passes or fails the trial. Kress et. al. demonstrated the clear benefit of daily sedation interruption with a significant reduction in the duration of mechanical ventilation and ICU length of stay[1]. Additionally, early and deep sedation are associated with increased risk of death for patients in the ICU[2-5]. Therefore, consistent

performance of daily SATs is an important part of patient care in the ICU and reduces patient mortality and morbidity. Even if the patient fails the trial and must restart sedative medication, results from SATs allow ongoing assessment for the need of sedation and the appropriate level of sedation.

Spontaneous breathing trials are performed by a respiratory therapist and involve removing or minimizing support from the mechanical ventilator for a predetermined period of up to two hours. If the patient can tolerate a lack of respiratory support for the duration of the SBT without any significant compromise of vital signs, the patient has “passed” the SBT. The respiratory therapist notifies the patient’s provider with SBT results, allowing the provider to decide if extubation is appropriate. A randomized, controlled trial conducted by Ely et. al. supports the ability of consistent SBT screening and its appropriate application to reduce the duration of mechanical ventilation[6]. Reduction in the duration of mechanical ventilation further prevents ventilator associated events and ventilator associated pneumonia[7, 8].

When paired together, SATs work synergistically with SBTs to reduce the time spent on mechanical ventilation, time spent in the ICU and hospital, and patient mortality[9]. Recognition of the clear benefit posed by the integration of SATs and SBTs has sparked the creation of standardized protocols coordinating SATs with subsequent SBTs known as “wake up and breath” protocols or the “B” in the “ABCDEF” ventilator liberation bundle[2, 10, 11].

Rationale

Despite the overwhelming evidence that daily, coordinated SATs and SBTs considerably improve patient care in the ICU, implementation, and subsequent adherence to integrated protocols, remains a significant challenge[12]. Recent literature guiding integrated SAT/GBT

protocols such as the ABCDEF bundle have characterized factors that influence bundle implementation and adherence in the ICU. A 2017 systematic review identified 107 barriers to implementing the ABCDEF bundle classified as patient-related, clinician-related, protocol-related, and ICU contextual barriers[13]. Patient-related barriers include patient instability and specific patient safety concerns[13]. Clinician-related barriers describe factors such as a clinician's knowledge of the protocol, expectation of ICU care team members, and lack of confidence in the protocol[13]. A 2020 study of nurse-reported perceptions ABCDEF bundle components characterizes the importance of clinician support in concluding that nurse attitudes did not influence bundle implementation but nurse manager and physician leadership strongly correlated with facilitation of bundle implementation[14]. Protocol-related barriers include the clarity of the protocol elements and acceptability of protocol implementation in staff workload[13]. ICU contextual barriers constitute factors related to ICU environment, staff culture, and interprofessional care team coordination[13]. An interprofessional approach with daily discussion of ABCDEF bundle elements on interdisciplinary rounds is well-described in the literature as facilitating high quality care for patients in the ICU[15, 16]. Prominent leadership from care team members such as physicians, nurse managers, and pharmacists further enhance efforts to coordinate SAT/SBT protocol implementation and adherence[17]. Finally, a 2020 literature review describes the importance of engaging the electronic health record (EHR) in facilitating team communication, clinical decision-making, and ongoing bundle compliance measurement for optimal ABCDEF bundle adherence[15].

Literature review of previous quality improvement initiatives centered around the implementation of protocols with daily coordinated SATs and SBTs suggest a multifaceted

approach with protocol education and support, interprofessional engagement of the ICU care team, and collaboration with the institution's EHR will be vital to quality improvement efforts.

Additionally, it will be important to verify the nature of the factors influencing adherence at our institution and be responsive to such factors in the design of our quality interventions.

Specific Aims

The aim of this project is to identify factors influencing adherence to the integrated spontaneous awakening and spontaneous breathing trial (SAT/SBT) protocol in our institutions' intensive care units and increase adherence to greater than 95% adherence during the intervention period defined as August 2020 to August 2023. The SAT/SBT protocol begins after a patient has been intubated and on a ventilator for 24 hours and ends once a patient has been extubated.

CHAPTER 2 Methods

Context

To help guide our efforts to improve our institution's adherence to the SAT/SBT protocol, we sought to characterize the factors influencing adherence amongst nurses and respiratory therapists in the ICU. Our investigational approach included (a) mapping the process of the integrated SAT/SBT protocol (fig. 2), (b) surveys with Likert scale questions assessing barriers described in the literature, (c) a five-point survey inspired by a similar approach taken in a quality improvement project by Kher et. al objectively assessing SAT protocol knowledge, (d) informal interviews with nurses and respiratory therapists, and (e) direct observation in the Medical ICU[18].

Factors influencing adherence were identified from survey responses by 63 nurses and 26 respiratory therapists, 30 hours of direct observation, and tabulated comments from surveys and informal interviews. We then applied the Systems Engineering Initiative for Patient Safety (SEIPS) sociotechnical framework to analyze the factors identified, formulate change ideas, and isolate specific interventions for implementation. The SEIPS model describes an integrated work system in the Medical ICU that influences the SAT/SBT process and its outcomes for patients, ICU care team, and the institution (Fig 3)[19]. The Medical ICU work system is further divided into people, tasks, organization, physical environment, tools and technology, and the external environment[19-21]. Factors influencing adherence were categorized by their corresponding element in the work system and tabulated in Table 1.

The factors identified in Table 1 are also depicted in fishbone diagrams specific to the SAT and SBT processes (fig. 4,5). The summation of this data was used to identify primary and

secondary drivers driving protocol adherence (fig. 6). Change ideas were constructed to address these drivers and sorted by their strength according to a hierarchy of effectiveness presented by Trbovich et. al.[22].

Interventions

- a. *Continuous Education:* Seven 30-to-45-minute education sessions were held synchronously and digitally with five presentations to the nursing staff and two presentations to the respiratory therapy staff. Each session consisted of a slide presentation explaining the importance of the protocol, introducing the quality improvement project and its aims, reviewing the protocol (SAT for the nurses and SBT for the respiratory therapists), and a question-and-answer session at the end with places for comments and feedback. Materials presented at the session were distributed for participant's reference. Surveys were administered both before and after protocol education session. Surveys comprised of Likert scale questions assessing nursing and respiratory therapist knowledge and attitudes towards the SAT and SBT protocols and documentation in the electronic medical record. Additionally, nursing staff answered a five-point knowledge assessment of the SAT protocol adapted from Kher et. al. [18]. Although the education sessions allowed for a comprehensive overview of the protocol and a chance to resolve any discrepancies that may have hindered protocol adherence, the sessions were limited by the breadth of nursing and respiratory therapists they were able to reach. Protocol education will require ongoing support for sustainable improvement in protocol knowledge.

- b. *EMR redesign*: One of the key factors influencing protocol adherence is interprofessional communication. To achieve the full synergistic benefit of a coordinated SAT/SBT protocol, respiratory therapist needs to be notified in a timely fashion of a passed SAT to begin screening for an SBT. To help facilitate this communication, we intend to alter the EMR to automatically add the SBT screening on the respiratory therapist's task list once the nurse documents a passed SAT. To support our educational efforts, we altered the SAT order set to include the screening criteria so that the protocol elements are made more available to the nurses within the EMR. Finally, to encourage a culture of continuous improvement, we will be adding SAT/SBT performance data on a side bar in the patient's EMR. This allows nursing and respiratory therapist to get real time feedback on their performance related to this protocol and the opportunity to improve if their compliance is suboptimal.
- c. *Data Surveillance and Feedback*: One of the primary challenges in ongoing support of our planned interventions is that of reliable and sustainable data surveillance. Periodic chart review, although effective, is not a sustainable or feasible long-term option for surveillance of our outcome measures. As such, we have engaged an automated data surveillance tool, Tableau, to feed data from the electronic medical record into real-time tracking of our quality measures. Utilizing run charts with performance goals, we will be able to immediately identify existing gaps in protocol adherence and provide actionable feedback to our stakeholders. Data will be presented regularly at nursing and respiratory therapy team meetings for immediate feedback.

- d. *Interdisciplinary Rounds*: To better embrace the interdisciplinary nature of the SAT/SBT protocol, including the care team in standardized interdisciplinary rounds will facilitate the necessary communication to advance ventilated patients through the protocol. This will allow for care gaps to be adequately addressed in real time, clinical nuances that may cause appropriate deviation from the protocol to be communicated and allow the team to ensure proper adherence to the protocol on a daily basis. Further, interdisciplinary rounds ensure that the results of screenings and trials are communicated to the appropriate provider.
- e. *QAPI Workgroup with Key Stakeholders*: The ICU Quality Assurance and Performance Improvement (QAPI) Workgroup allows representatives from each key stakeholder to meet on a regular basis, provide feedback, and troubleshoot challenges in intervention implementation. Not only does the QAPI allow regular engagement amongst the quality team, but it supports a high-reliability team structure in providing an avenue for nursing and respiratory staff to express questions or concerns with quality interventions to ICU leadership.

Measures

Our key process measures will include the SAT and SBT screening rates, completion rates, and counts of correct provider notification. SAT screening rates are calculated by dividing the SAT screens documents (either pass or fail) by the total number of vent-days. SBT screening rates are calculated by dividing the number of SBT screens documents (either pass or fail) by the number of SATs passed. SAT completion rates are calculated by dividing the number of SATs done (either pass or fail) by the number of SAT screens passed. SBT completion rates are calculated

by dividing the number of SBTs done (either pass or fail) by the number of SBT screens passed.

The counts of correct provider notification will comprise of the number of documented communications of SAT results to respiratory therapy staff and SBT results to the first on-call provider.

Balancing measures will include 48-hour reintubation rates and ongoing assessment of the nursing and respiratory therapists' satisfaction with the protocol and interventions. We will be working with the EMR team to ensure that any changes made in the EMR are feasible and acceptable for the nursing and respiratory staff.

Key outcome measures will include the days spent on mechanical ventilation (vent-days), and ICU length of stay (ICU LOS). Consistent application of the SAT/SBT protocol is literature proven to improve these metrics for patients in the ICU.

Analysis

Qualitative data yielded from synchronous education sessions, surveys, and direct observation was compiled into separate fishbone diagrams for the SAT and SBT protocols (Fig. 4, 5). The ICU environment was modeled using the Systems Engineering Initiative for Patient Safety, or SEIPS model, as depicted in figure 3 [19-21]. Qualitative data illustrated in the fishbone diagrams were then fitted to our SEIPS ICU model to better represent the complex interplay between different factors influencing protocol adherence (table 1).

Future quantitative data surrounding our process, outcome, and balancing measures will be analyzed through run charts and tables depicting adherence measures in real time.

Ethical considerations

The integrated spontaneous awakening and spontaneous breathing trial protocols are a national standard of care, therefore increasing adherence to the protocol does not pose any significant ethical considerations.

CHAPTER 3 Results

Spontaneous Awakening Trial and Nursing Education Sessions

In response to Likert scale questions assessing knowledge and attitudes related to the SAT protocol, results suggest a general confidence in performing the SAT protocol and knowledge of where to find the protocol if needed (Fig. 7). This is indicated by the fact that 70% or greater of nurses rated each statement “strongly agree” or “agree” and that only 10% or less of nurses rated the same statements as “strongly disagree” or “disagree.” The one exception is the statement, “the SAT protocol is easy to follow for every patient on mechanical ventilation,” where only 52.5% of nurses rated it as “strongly agree” or “agree” and 15% of respondents rated it as “strongly disagree” or “disagree.” Interestingly, results from a five-point protocol knowledge assessment tool yielded an average score of only 67.8% correct with a standard deviation of 20.6% (n=23) indicating a wide variability in actual protocol knowledge.

Despite highly ranked confidence in identifying the person to whom the SAT results need to be communicated, there seems to be mixed consensus on who that person should be. In a short response question asking nurses to identify the person to whom the results need to be communicated, only 30% of nurses said the respiratory therapist (RT) alone. 38% identified only the provider as the appropriate person and 30% said both the provider and the RT (Fig 8). Although the majority identified the RT to some degree, the provider was included in most responses as well, adding to the concern for the sentiment that the SAT is a provider-driven process rather than nursing-driven.

In response to Likert scale questions assessing knowledge and attitudes towards the documentation of the SAT protocol, results suggest a general knowledge of where to document

SAT screening and SAT results, an understanding that documentation is required for every SAT screen or SAT conducted, and that documentation is easy (Fig. 9). This is indicated by the fact that 70% or greater of nurses rated each statement “strongly agree” or “agree” and that only 15% or less of nurses rated the same statements as “strongly disagree” or “disagree.” The one exception is the statement, “Documentation of a SAT screen and/or SAT adds significantly to my workload,” where 50.5% of nurses rated it as “strongly disagree” or “disagree” and 12.5% of nurses rated it as “strongly agree or “agree.”

Survey comments and key items brought up by the nurses (RNs) during the educational session were documented. These comments were grouped alongside inferences from survey results in a fishbone diagram depicting key factors influencing SAT protocol adherence (Fig 4.)

Spontaneous Breathing Trial and Respiratory Therapy Education Sessions

Results from Likert scale ratings assessing respiratory therapists’ (RT) attitudes and knowledge towards the SBT protocol (Fig. 10) were like those of the RN’s described previously. Additionally, results from Likert scale ratings of statements assessing RT knowledge and attitudes towards SBT documentation are largely positive and like those of the RNs (Fig. 12). The one exception being the response to the statement, “Documentation of an SBT screen and/or SBT adds significantly to my workload” where responses were variable.

RT knowledge of how to communicate SBT results was assessed from two short answer questions: one asking to whom SBT passes would be communicated and one asking about SBT failures. Answers to these questions were identical, and they are presented as one in Fig 11. The results were largely insignificant in identifying any discrepancies as compared to RN results described above.

Survey comments and key items brought up by the RTs during the educational session were documented. These comments were grouped alongside inferences from survey results in a fishbone diagram depicting key factors influencing SBT protocol adherence (Fig 5.)

Systems Engineering Initiative for Patient Safety Model

To better understand the complex interactions between key elements of the intensive care unit, stakeholders involved in protocol execution, and the context surrounding our interventions, the SEIPS model was employed. Figure 3 pictorially depicts the model with the ICU work system, integrated SAT/SBT process, and key outcomes influenced by the previous elements. Each of the factors influencing adherence identified in figures 4 and 5 can be re-organized beneath each aspect of the ICU work system (physical environment, people, tasks, tools and technology, and organization). Table 1 depicts this organization by grouping key factors into the subcategories “person factors”, “tools and technological factors”, “task factors”, “physical environment factors”, and “organizational factors.”

Intervention Design and Implementation

After isolating key factors influencing adherence and modeling such factors according to the SEIPS model, we were able to strategically draft specific change ideas for intervention. These change ideas are depicted in Figure 6 as a driver diagram, grouped by specific drivers of protocol adherence. They are further color coded by effectiveness according to Trbovich et. al. [22]. Specific change ideas were chosen for implementation according to perceived feasibility, acceptability, and ability to address the spectrum of elements of the work system identified in the SEIPS model.

Anticipated Data

As our interventions are still in the initial stage of implementation, specific data relating to our adherence measures is not yet available.

CHAPTER 4 Discussion

Summary

Although effective implementation of an integrated spontaneous awakening and spontaneous breathing trial protocol is shown to reduce ICU morbidity and mortality, adequate adherence to such a protocol is influenced by many factors in the ICU environment. Data from a retrospective chart review and ethnographic investigation of SAT/SBT protocols addressed our specific aims by revealing a baseline level of sub-optimal adherence and elucidating the specific factors influencing adherence at our institution. Chiefly, these factors included electronic medical record design and usability, protocol knowledge, awareness of current institutional performance, and sub-optimal interdisciplinary communication. By modeling the many factors influencing protocol adherence with the SEIPS model, we were able to identify strategic points of intervention that would optimize performance across the entire ICU work system.

Interpretation

- a. Electronic Medical Record (EMR) Redesign: Based on survey feedback and commentary from nursing and respiratory therapy staff, the documentation of SAT and SBT results was inconvenient. This prohibits the consistent monitoring of protocol adherence as the only way to confirm an SAT and/or SBT was appropriately conducted or deemed contraindicated is through documentation. Additionally, the electronic medical record serves as powerful platform to encourage protocol adherence through automatization of result communication and making the protocol readily available for reference. By first streamlining the documentation workflow with nursing and respiratory therapy input, we anticipate greater adherence rates by virtue of more accurate documentation. Then, by

optimizing the digital workspace by making the SAT and SBT protocol available in the EMR for reference and auto populating the SBT screening on the respiratory therapists work list upon documentation of an SAT pass by the nurse, we can increase adherence. These specific interventions with the EMR address the person factors of protocol knowledge, the task factors of ease of result documentation, and the organizational factors of result communication between nurses and respiratory therapist. Through the SEIPS model provided in Figures 3, the planned interventions in the EMR illustrate how the tools and technology in the ICU can positively impact protocol adherence through influence on person, tasks, and organizational factors.

- b. Data Surveillance and Feedback: One of the more surprising factors influencing adherence identified in our investigation was that of awareness of institutional goals for SAT/SBT compliance. We can better encourage protocol adherence by making our adherence data more available to key stakeholders through regular presentation at staff meetings. Additionally, building an infrastructure for automated, sustainable data collection and analysis over time will allow quality leadership to make real time adjustments in proposed interventions for better adherence rates.
- c. Interdisciplinary Rounds: What may likely be known as the keystone factor influencing adherence rates is that of interdisciplinary communication and relationships. The successful implementation of the SAT/SBT protocol involves providers from multiple facets of the patient care team and therefore, depends heavily on effective communication between these groups. Additionally, differences between rounding structure between intensive care units convolutes the communication of key results

between providers – especially when providers float between units. Therefore, the institution of standardized, interdisciplinary rounds across intensive care units will address such issues. This will ideally provide a platform for result communication, clarifications on protocol deviations when necessary, and allow care team members to engage more effectively with the entire patient care team. This intervention will influence each aspect of the SEIPS work system, illustrating the importance of organizational factors in supporting protocol adherence.

- d. Continuous Education: As noted in the survey results, there seems to be identifiable gaps in protocol knowledge. One-time educational sessions, as employed in our initial investigation, are not sufficient for sustainable impact in protocol knowledge. Effective support of new hires and ongoing educational efforts will require frequent and strategic educational sessions. These future sessions may be provided synchronously in monthly staff meetings or asynchronously through reference material or educational modules. Although this may not be anticipated to be a highly effective measure to increase adherence, it will be an important and feasible addition to our planned interventions by supporting identified “person factors” with continuous protocol education.
- e. Quality Assurance and Performance Improvement (QAPI) Workgroup with Key Stakeholders: Evident from several organizational factors identified to influence protocol adherence, a highly reliable leadership structure would greatly benefit adherence improvement efforts. Indeed, the literature supports identifying specific leaders for SAT/SBT compliance efforts as an effective measure to improve adherence [17]. By forming a QAPI workgroup with representatives from physician, nursing, respiratory

therapy, and institution quality leadership, we may provide avenues for regular feedback from key stakeholders. Regular meetings amongst workgroup members will also serve to adequately address challenges as they arise and ensure planned interventions are functioning to increase protocol adherence. Having a highly reliable leadership structure will positively impact each factors influencing adherence identified in our ICU work system.

Limitations

The successful implementation of planned interventions and data collection thereafter is subject to limitations. Early in the development of our quality improvement efforts, the COVID-19 pandemic began and effectively halted any progress made towards intervention development. The regular SAT/SBT protocol was not applied to patients with COVID-19 and resources were devoted towards addressing the challenges of the pandemic in the ICU.

Significant limitations for external validity our study include variations in cultures of interdisciplinary communication and differences in rounding structures that may exist across different institutions.

Internal variations between ICUs also poses potential limitations in internal validity. Different intensive care environments (surgical, neuro, cardiac, medical, etc.) have different interprofessional dynamics, rounding practices, and pathology that limit the generalizability of the SAT/SBT protocol and its execution. We sought to embrace these differences but also provide standardized rounds as an intervention itself to mitigate the limitations these variations pose.

Conclusions

An integrated spontaneous awakening and spontaneous breathing trial protocol remains standard of care for patients on mechanical ventilation, however adherence to such a protocol poses a significant challenge. We have been able to specifically isolate the factors influencing adherence at our institution, effectively modeled these factors using the Systems Engineering Initiative for Patient Safety, and designed promising interventions that act upon multiple key elements in the ICU environment to improve protocol adherence. Although the efficacy of our interventions on adherence measures remains to be seen, it is important to highlight the approach we took to identify the source of poor adherence in our intensive care units. One may expect the challenges facing effective SAT/SBT protocol adherence may differ across institutions, thus the exact interventions employed in our work may not be effective elsewhere. Therefore, our systematic approach in engaging key stakeholders to elucidate the source of poor adherence rates is arguably more significant to other intensive care units facing similar challenges in executing a combined SAT/SBT protocol. Additionally, these methods may be applied to other protocols outside of the ventilator weaning efforts or even beyond ICU care.

Currently, we are ensuring sustainability through automated data collection and analysis. Next steps will include intervention evaluation with preliminary data with adherence measures.

Funding

This project was funded through the UT Southwestern Department of Quality Improvement and Patient Safety.

LIST OF TABLES

Table 1: Factors in the SEIPS Model

Person Factors	Tool and Technological Factors	Task Factors	Physical Environment Factors	Organizational Factors
<ul style="list-style-type: none"> • Nursing knowledge of SAT protocol • Respiratory therapist knowledge of SBT protocol • Physician expectations of protocol execution by nurses and respiratory therapists • Training of new hires or persons unfamiliar with the protocol • Awareness of institutional push for SAT/SBT compliance 	<ul style="list-style-type: none"> • Design of electronic medical record (EMR) and its ease of use • Accessibility of SAT/SBT documentation • Accessibility of protocol guidelines 	<ul style="list-style-type: none"> • Protocol logistics and Timing • Task complexity and patient- specific considerations • Protocol integration into nursing and respiratory therapist workload 	<ul style="list-style-type: none"> • Differences in protocol guidelines in MICU vs other units • Patients requiring monitoring for SBT on opposite sides of the ICU 	<ul style="list-style-type: none"> • Miscommunication between providers and nurses/respiratory therapists concerning appropriate deviations from protocols • Inclusion in interdisciplinary rounds or lack thereof • Nurse and respiratory therapist perceived ownership of their respective protocols • Communication between nurses and respiratory therapists • Fear of push-back from provider

LIST OF FIGURES

Figure 1: Data from a retrospective chart review in the Medical ICU

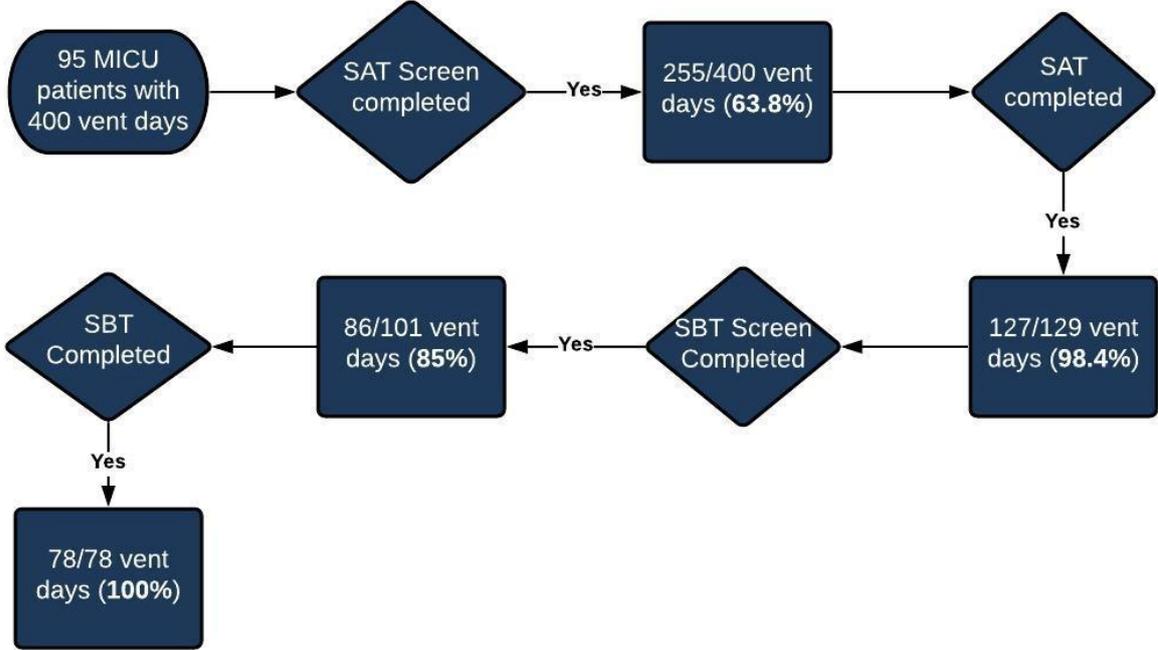


Figure 2: Process map of integrated SAT/SBT protocol

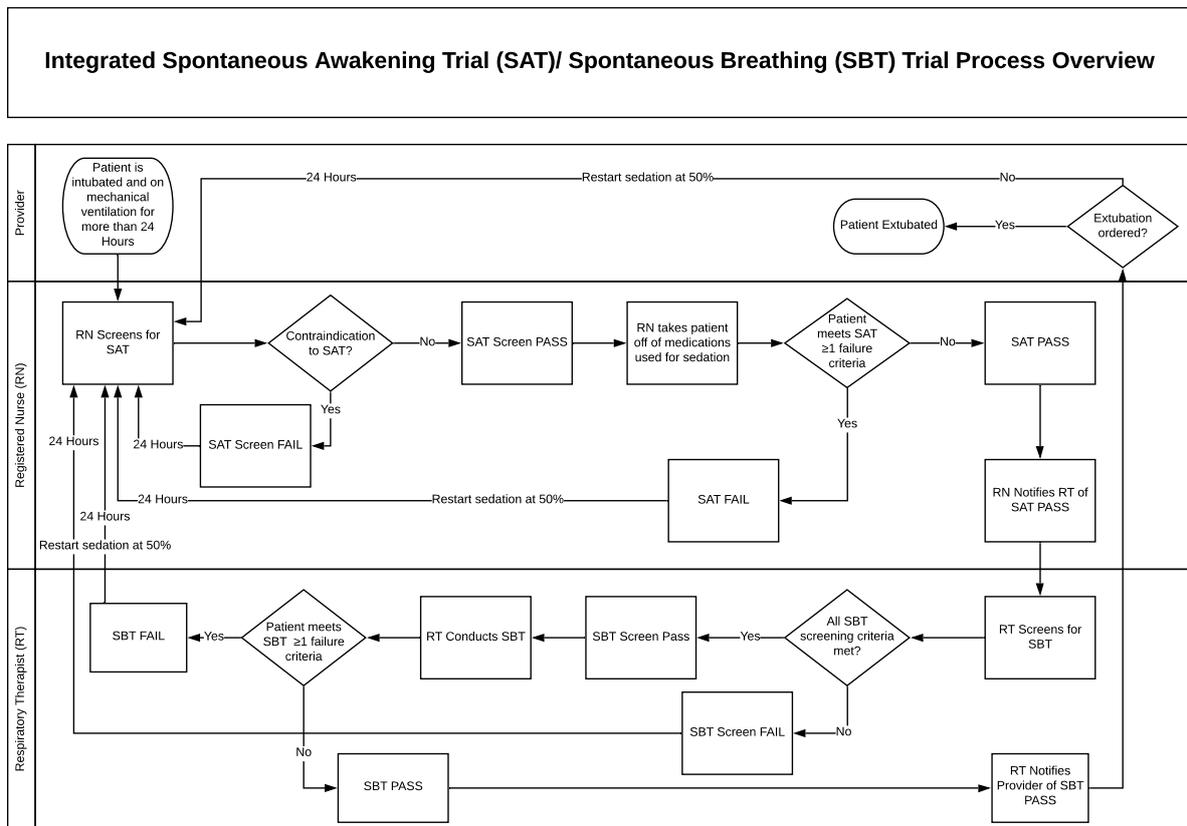


Figure 3: SEIPS Model in the medical ICU

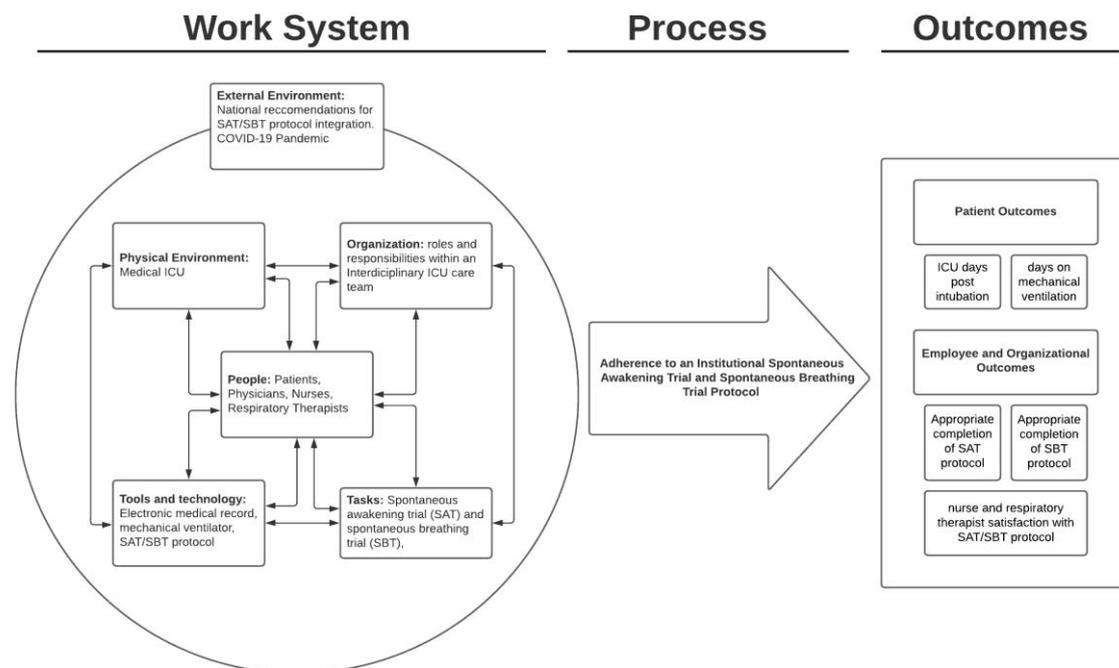


Figure 4: SAT Fishbone Diagram

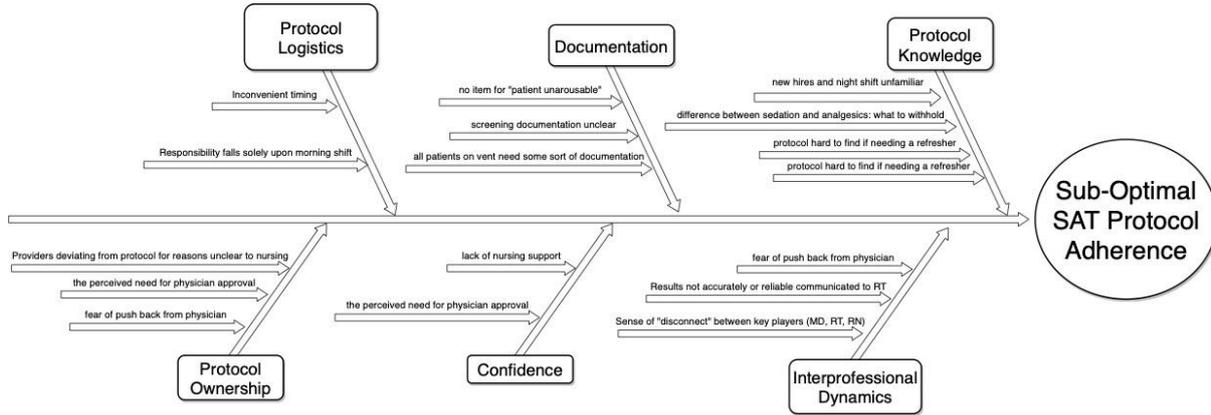


Figure 5: SBT Fishbone Diagram

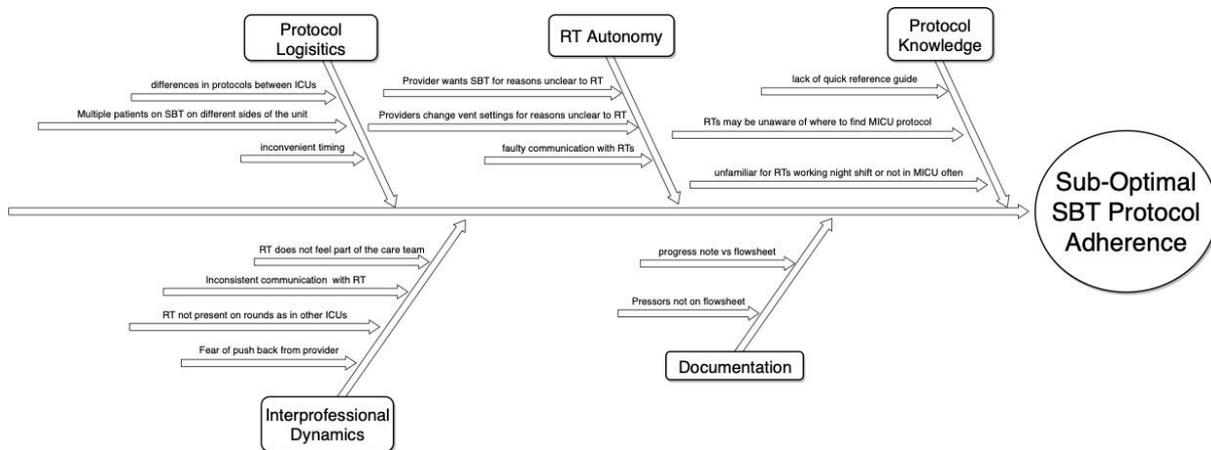


Figure 6: Driver Diagram with proposed change ideas

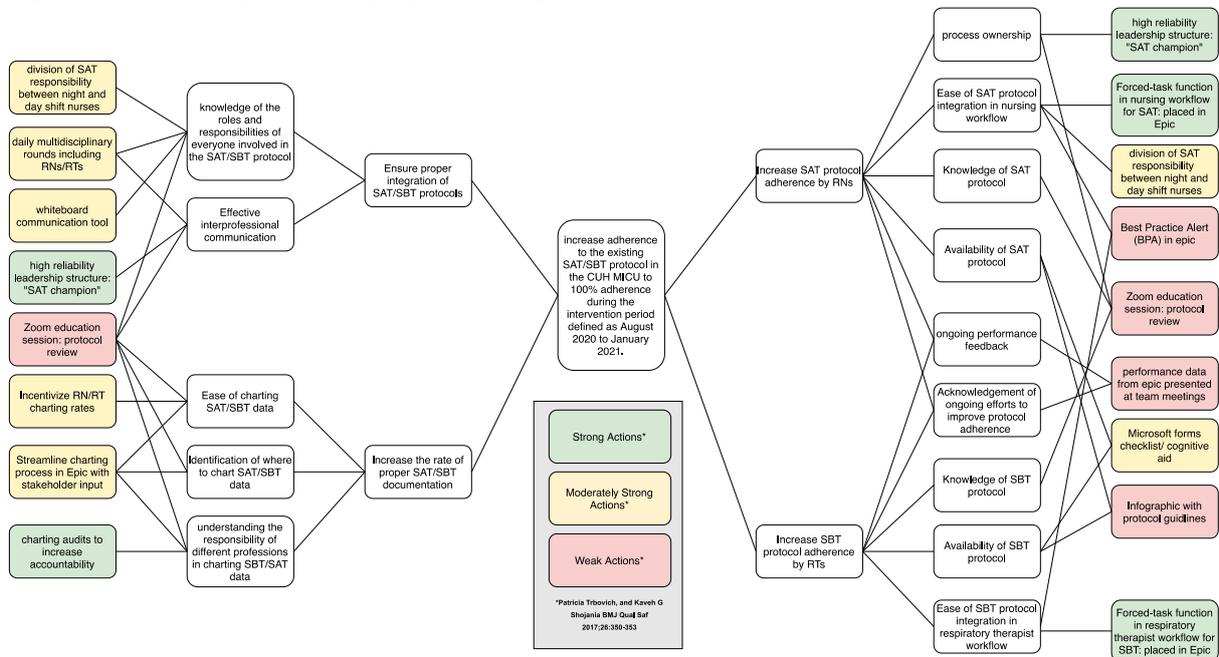


Fig. 7: SAT Protocol Knowledge and Attitudes

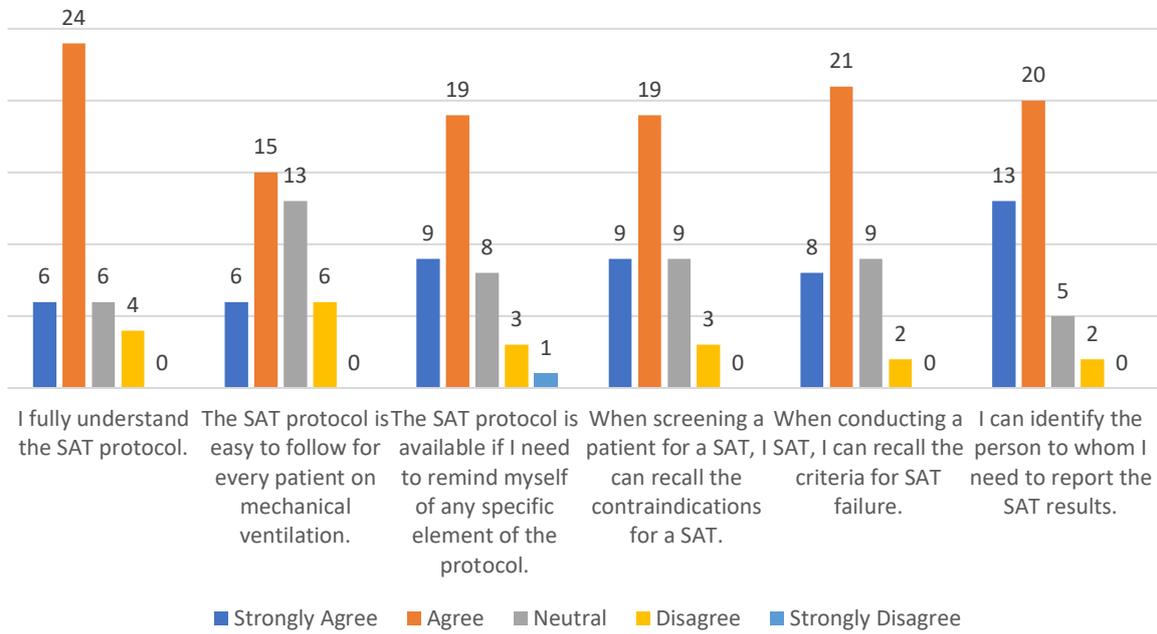


Fig. 8: SAT Results Communication

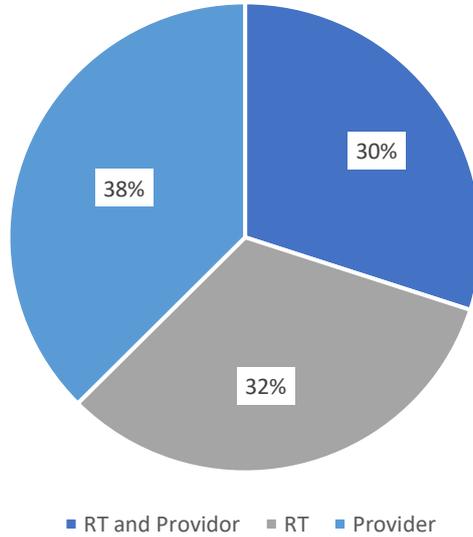


Fig. 9: SAT Documentation Knowledge and Attitudes

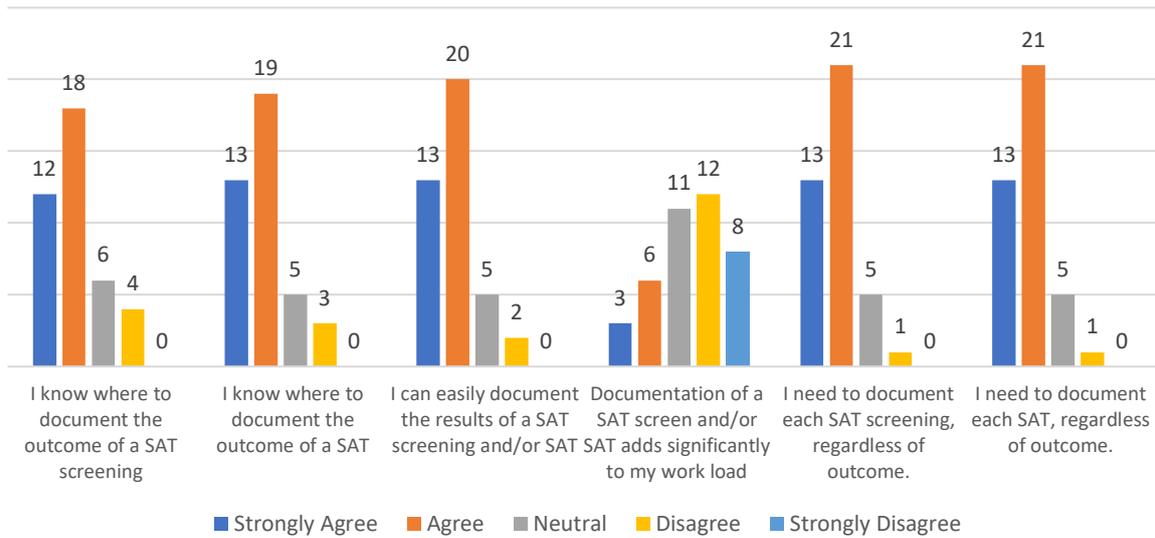


Fig. 10: SBT Protocol Knowledge and Attitudes

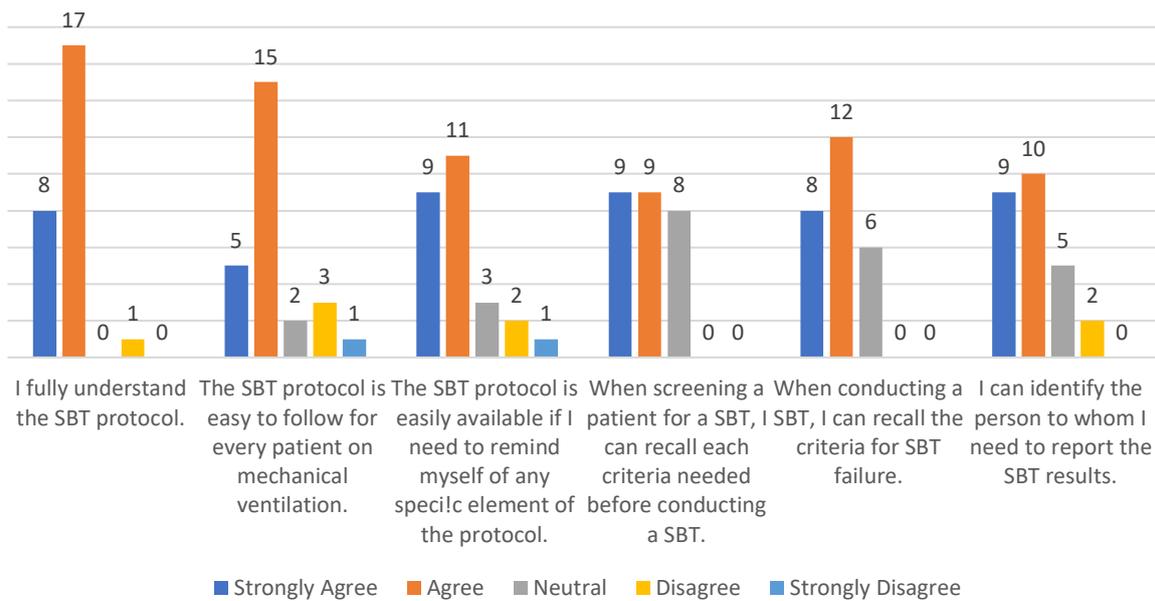


Fig. 11: SBT Results Communication

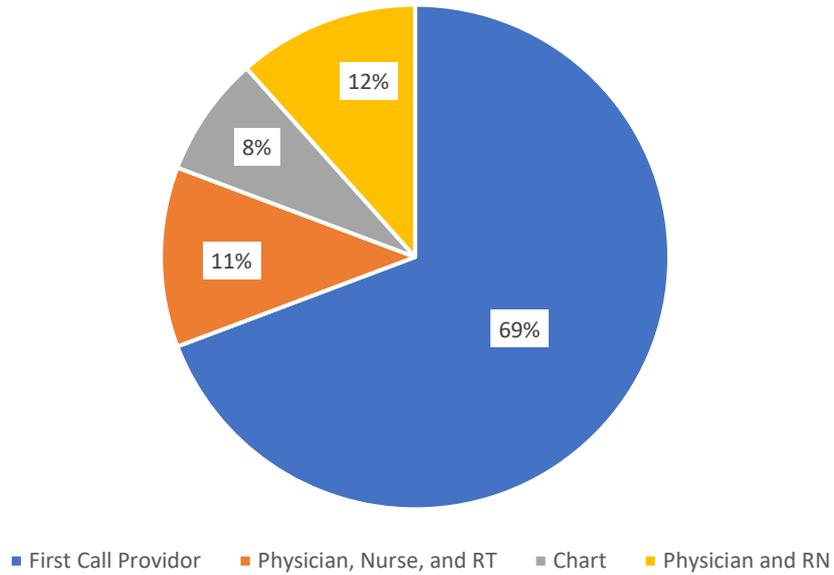
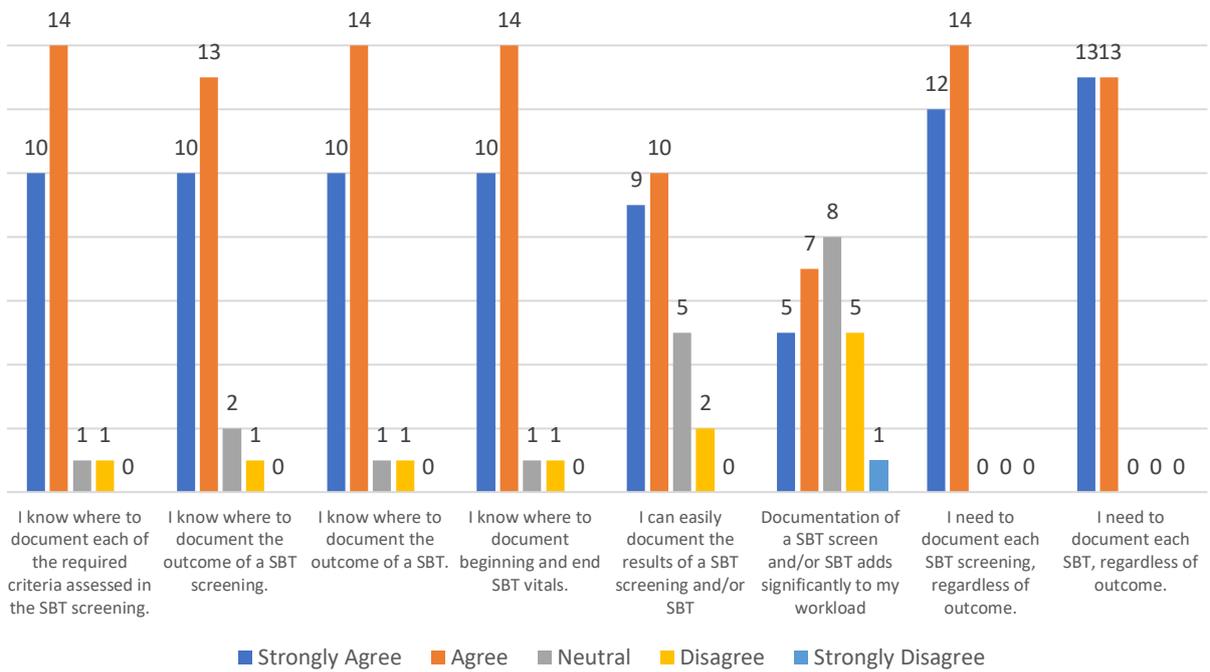


Fig. 12: SBT Documentation Knowledge and Attitudes



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VITAE

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