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Anxiety and Agitation in Mechanically Ventilated Patients

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Abstract

During an ethnography conducted in an intensive care unit (ICU), we found that anxiety and agitation occurred frequently, and were important considerations in the care of 30 patients weaning from prolonged mechanical ventilation. We conducted a secondary analysis to (a) describe characteristics of anxiety and agitation experienced by mechanically ventilated patients; (b) explore how clinicians recognize and interpret anxiety and agitation and (c) describe strategies and interventions used to manage anxiety and agitation with mechanically ventilated patients. We constructed the Anxiety-Agitation in Mechanical Ventilation Model to illustrate the multidimensional features of symptom recognition and management. Patients' ability to interact with the environment served as a basis for identification and management of anxiety or agitation. Clinicians' attributions about anxiety or agitation and "knowing the patient" contributed to their assessment of patient responses. Clinicians chose strategies to overcome either the stimulus or patient's appraisal of risk of the stimulus. This article contributes to the body of knowledge about symptom recognition and management in the ICU by providing a comprehensive model to guide future research and practice.

Keywords

comfort/comforting; dimensional analysis; ethnography; event analysis; interviews; nursing; observation, participant; psychosocial issues; symptom management; intensive care unit (ICU)

More than 6 million adults per year experience critical illness (Angus et al., 2004) and face consequent physical discomfort (Herridge, 2009) and psychological distress (Desai, Law, & Needham, 2011). Patients report unpleasant physical symptoms such as pain, dyspnea and thirst and psychological symptoms such as anxiety and agitation (Nelson et al., 2001; Puntillo et al., 2010). Psychological symptoms are attributed to a variety of factors such as inability to communicate, family absence, and weaning from the ventilator (Rotondi et al., 2002).

Anxiety and agitation are particularly challenging for several reasons. They have behavioral manifestations and symptom profiles similar to other conditions such as pain and delirium. Typically, the presence of anxiety is validated by a verbal statement from the patient. Mechanically ventilated patients are unable to express their feelings verbally or confirm clinicians' interpretations of the meaning of their behavioral responses reliably. Symptom

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assessment that is inaccurate, incomplete, or ineffective might negatively impact clinical outcomes (Campbell & Happ, 2010).

Although patients describe anxiety and agitation associated with critical illness and agitation as distressing, limited attention has been paid to evidence based assessment and management strategies. Researchers report variability in administration of sedation (Weinert & Calvin, 2007), yet few studies address the process critical care clinicians employ to assess and manage anxiety and agitation.

During an ethnographic study of weaning from prolonged mechanical ventilation in a critical care unit [R01-NR7973, PI Happ], we observed patients frequently exhibiting anxiety and agitation. These symptoms undermined patient comfort and stability and interfered with therapeutic goals, including successful ventilator weaning (Tate et al., 2005). Although weaning from prolonged mechanical ventilation was the context, these symptoms were pervasive and seemed inextricably linked with the experience of being critically ill. The prominence and prevalence of anxiety and agitation in this setting highlighted the importance of gaining a more in-depth understanding of the manifestations, interpretation and management of anxiety and agitation. This led us to explore anxiety and agitation events both within and outside of ventilator weaning trials as a distinct and logical extension of the parent study.

In this article, we (a) describe characteristics of anxiety and agitation experienced by mechanically ventilated patients; (b) explore how caregivers recognize and interpret manifestations of anxiety and agitation; (c) describe strategies and interventions used to manage anxiety and agitation in the critical care setting, and (d) present a model.

Background

Anxiety

Anxiety, defined as a feeling of dread, fear and/or lack of control as a normal or protective response to a perceived threat to homeostasis (Bay & Algase, 1999) is experienced universally across cultures, has existed in humans throughout history, and can be observed in many species of animals (DeGrazia & Rowan, 1991). Anxiety is a complex phenomenon that can profoundly affect psychological wellbeing and physiologic stability. This is especially troublesome for critically ill patients who are susceptible to even minor changes in equilibrium.

Patients' descriptions about the experience of being critically ill have been relatively consistent over the last 20 years. Patients associate anxiety with the inability to communicate, difficulty sleeping, and distorted perceptions (Bergbom-Engberg & Haljamae, 1989; Claesson, Mattson, & Idvall, 2005). Anxiety is commonly reported with an incidence that ranges from 30.8% (Kress et al., 2003) to 80% (Chlan, 2003). This range is due to operational definitions and demonstrates the variability in identifying anxiety and agitation. Notably, literature on patient reports of anxiety during critical illness is limited to survivors of critical illness who are cognitively intact and able to communicate about and reflect on their ICU experience. Consequently, the literature might not fully describe the experience.

Whereas critical care nurses acknowledge that anxiety assessment is an important component of their practice (Frazier et al., 2002), assessment of anxiety is not routinely or systematically performed (O'Brien et al., 2001). When assessment is performed, critical care nurses rely on behavioral signs such as agitation or restlessness or physiologic indicators of anxiety (Frazier, et al., 2002). ICU physicians, nurses and members of the health care team use inconsistent and variable terms to describe anxiety and other psychological symptoms

(Broyles, Colbert, Tate, Swigart, & Happ, 2008; Egerod, 2002). They exhibit variable expertise in diagnosing anxiety and often misinterpret patient's behaviors and communication attempts as anxiety or agitation and act on those interpretations inconsistently (Egerod, 2002).

Agitation

Agitation is defined as “disquietude”, (Crippen & Ermakov, 1992) “violent motion”, and “tumultuous emotion” (Cohen et al., 2002) and involves increased intensity in behavioral and psychological dimensions (Chevrolet & Jolliet, 2007). Agitation is a visible cue that can occur in isolation, or accompany extreme anxiety (Frazier et al., 2003), delirium (Chevrolet & Jolliet, 2007) or brain dysfunction (Crippen & Ermakov, 1992). Agitation is common in critical care as a result of waxing and waning levels of consciousness or patients awakening from sedation. Agitated patients exhibit behaviors such as restlessness or thrashing, that interfere with care and place themselves and others at potential risk for harm. The reported incidence of agitation in critically ill patients is highly variable, ranging from 16-71% (Fraser, Prato, Riker, Berthiaume, & Wilkins, 2000; Jaber et al., 2005; Woods et al., 2004). The substantial variability likely results from the varying operational definitions of agitation used in these studies with stricter definitions associated with a lower reported incidence.

Consequences of Anxiety and Agitation

Potential negative outcomes of anxiety and agitation include medical device disruption and increased oxygen consumption (Woods, et al., 2004), yet interventions are not benign. Iatrogenic complications associated with interventions such as sedation or restraints include immobility, changes in level of consciousness and loss of protective reflexes (Sessler et al., 2001). Excessive or prolonged sedation might prolong mechanical ventilation and hospitalization, predisposing the patient to ventilator associated pneumonia, lung injury, malnutrition, polyneuropathy and long term negative psychiatric outcomes, such as depression and posttraumatic stress disorder (Arroliga et al., 2005; de Jonghe, Lacherade, Sharshar, & Outin, 2009; Jones et al., 2007). No studies were identified that examined the combination of anxiety and agitation symptoms and few studies have explored anxiety and agitation from multiple perspectives.

Measurement of Anxiety

Researchers have developed measures of anxiety during critical illness using self-report (McKinley, Coote, & Stein-Parbury, 2003) although psychometric rigor of these instruments has yet to be established. Attempts at multidimensional measurement have been fraught with difficulty. It might be unreasonable to assign a single numeric to quantify observations of complex psychological states. Also, symptom profiles of psychological states are not mutually exclusive and multiple emotions can occur simultaneously. We agree with Morse (2010) that complex clinical phenomena might not be captured appropriately or completely by standard psychological instruments. Therefore, examination of behavioral manifestations of psychological or emotional states in a more comprehensive manner is important. We provide a more thorough description from the viewpoint of individuals who experience and manage anxiety and agitation during critical illness.

Methods

Design

We used existing data from an ethnographic study of 30 critically ill patients who were weaning from prolonged mechanical ventilation. The dataset for the parent study included observational, interview, and medical record data. The periods of observation ranged from

3-65 days per patient with a total of 655 days in the dataset for the cohort (Happ et al., 2007). We chose qualitative secondary analysis for this study because (a) the phenomena of anxiety and agitation were frequently occurring in the existing dataset; (b) the dataset was extensive; and (c) use of the dataset maximized participation of this vulnerable population (Heaton, 2004). We expanded the analysis to include questions about anxiety and agitation as a common and important phenomenon that occurred both within and outside of weaning events. The principal investigator and two research team members were part of the original study team; three members with prior qualitative experience were involved in analysis. We conducted fieldwork from November 2001 to July 2003. The Institutional Review Board approved this study.

Sample and Setting

The sample for the parent study consisted of 30 purposively selected patients, their family members and clinicians who cared for them. All study patients were enrolled from a 20-bed medical intensive care unit (MICU) and an 8-bed MICU step-down unit and required mechanical ventilation for at least 4 days with a minimum of 2 failed weaning attempts. Their family members and the clinicians who cared for them were also observed and interviewed. The sample selection resulted in variability in severity of illness (Acute Physiology and Chronic Health Evaluation III), neurologic status (Glasgow Coma Scale), medical diagnosis, age, sex, and race (Table 1). All patients experienced or reported anxiety or agitation on at least one occasion.

During the parent study, we observed patients, clinicians caring for these patients and family members during clinical care and medical rounds. We also conducted de-briefing interviews after observations of care and recorded them in field notes. Clinicians participated in formal interviews providing additional information about specific cases and the effects of anxiety and agitation on practice in critical care. The clinicians represented several disciplines and included 11 physicians (MD), 10 nurses (RN), 7 respiratory therapists (RT), and 3 others. Five clinician participants participated in follow-up interviews to provide additional data about management of anxiety and agitation. Patients and family members also participated in formal interviews to describe their perceptions of mechanical ventilation and barriers and facilitators of weaning. Family members included 15 spouses, 8 adult children, 5 parents, and 3 siblings. We interviewed patients after they were extubated or when a tracheostomy speaking valve was applied. Other patients communicated by mouthing words or pointing to a letter board.

Documents

To prepare data for analysis, an uncoded version of the original dataset was transferred into a new ATLAS.ti software database (2009) for management of qualitative data and coding. Data were abstracted using keywords derived from the literature and clinical experts as indicators of anxiety or agitation events such as restlessness, resisting care and pulling tubes (Jaber, et al., 2005). Narrative clinical documentation recorded by direct caregivers provided “real time” descriptions of anxiety-agitation events from the clinician perspective. Additional data available from the medical record included vital signs, lab data, ventilator settings and duration of daily weaning trials as well as demographic (admission diagnosis, hospital and ICU length of stay), medication administration, and other therapeutic records. In addition, documentation of pharmacological treatments such as sedatives, anxiolytics or analgesics identified episodes and treatments of anxiety and agitation and conditions for treatment selection. We included analgesics in the review because of their anxiolytic effect, but limited to instances in which there was a corresponding behavior indicating anxiety or agitation. Each instance of anxiety or agitation described in the clinical record or observational field notes was identified.

Data Analysis

Event analysis was used to describe and explain human interaction related to the recognition and management of anxiety and agitation (Happ, Swigart, Tate, & Crighton, 2004). Each event was analyzed using dimensional analysis techniques to identify properties and dimensions of causal conditions, patient responses, clinician actions and strategies, intervening conditions, consequences and context (Kools, McCarthy, Durham, & Robrecht, 1996). We merged numerical and textual data for each event with textual data that corresponded by date and time in a tabular form (matrix) to examine patterns of anxiety and agitation events within and across cases (Miles & Huberman, 1994). We analyzed matrices to describe the contextual factors and clinician actions, including pharmacologic and nonpharmacologic interventions, used to manage anxiety and agitation.

We conducted qualitative coding of text and matrices within and between cases. The unit of analysis was phrases and sentences that described dimensions of anxiety or agitation. Once we completed descriptions and coding for several cases, we compared cross-case events of anxiety and agitation. Each event generated questions such as “What is going on here?” “With whom?” “What are the circumstances?” (Kools, et al., 1996). Patterns within and between cases were examined using constant comparative analysis (Strauss & Corbin 1990). This led to collapsing of codes into themes or categories. We saw no new themes or patterns.

We examined graphic displays of data to confirm patterns (Figure 1). For instance, sedation and analgesia administration was redisplayed in a graphic with an overlay of anxiety descriptions. The analytic process also included diagramming relationships between concepts.

During analysis, opposing views about attribution of anxiety and agitation became apparent. Because two conflicting stances often existed in the same context, the data coded as attribution were reanalyzed using dialectic inquiry, a qualitative analytic technique that explores competing models of thought about the same phenomenon (Berniker & McNabb, 2006). Dialectic inquiry was used to confirm, define, and explain these coexisting opposing viewpoints.

We maintained methodologic rigor and trustworthiness in four ways (Lincoln & Guba, 1985; Morse & Field 1995; Sandelowski, 1986). An audit trail of methodologic notes and analytic memos was recorded systematically to detail thoughts and establish dependability. Multiple data sources were cross-checked or triangulated to support confirmability. Credibility was established through member checks with 5 clinician participants and consultation with critical care colleagues to determine if the analysis accurately reflected critical care practice. Prolonged engagement within the ICU enhanced the potential to achieve a thorough understanding of the phenomenon. Weekly analysis meetings established credibility and fittingness as findings were validated (Morse & Field 1995); this included review and critique of analytic lines as analysis progressed. The purposive sample as well as thick descriptive data and rich description of context established transferability.

Results

Prevalence of Anxiety & Agitation Events

All patients exhibited agitation or described feeling anxious at least once during the study period. The incidence of anxiety or agitation events ranged from 1 to greater than 200 events per patient case. Of the 30 patients, 22 expressed feelings of fear and/or anxiety during direct observation, recorded clinician notes, or interviews. The 8 remaining patients who were less interactive with the environment, demonstrated agitation in the form of

hyperactive psychomotor movement at least once during the study period. Of the 18 patients able to participate in interviews, 12 indicated instances of feeling afraid or anxious. Patients did not use the term, “anxiety,” to describe their experience; rather, they used words linked conceptually to anxiety to describe their feelings, such as fear, panic, and frustration. Fear was included because of conceptual overlap with anxiety (Bay & Algase, 1999) and linkages between fear, anxiety and agitation in the literature (Claesson, et al., 2005).

Interaction as the Core Process

The patient’s level of interaction with the environment was identified as the core process in recognizing and managing anxiety and agitation in the ICU. This concept was chosen as a core process because: (a) the patient’s ability to interact was repeatedly used to describe patients’ behaviors, (b) the patient’s level of interaction influenced other actions and consequences and (c) interaction integrated all other processes associated with events of anxiety or agitation. To demonstrate the importance of interaction as a core process, we clustered patients along a diagonal continuum from low to high according to their usual state of interaction with the environment during the observation period (Figure 2). Based on these clusters, we were able to parsimoniously relate level of interaction to clinicians’ attributions, assessments and interventions.

Cluster 1 patients were the least interactive i.e., two brain injured patients who had little to no interaction with the environment. They were observed “biting on the endotracheal tube” which is considered a behavior indicative of agitation.

Cluster 2 patients were minimally interactive. They reacted to stimuli but did not seem to understand or respond appropriately. They did not respond consistently to verbal or tactile stimuli nor did they follow verbal commands. Clinicians interpreted their behaviors as “resisting care” and “agitated with care” during turning and bathing, suggesting ability to interpret the touch of the RN in a meaningful and non-threatening way was impaired. As an example, one elderly woman laid motionless the majority of time. She opened her eyes to command, followed a few simple commands and responded to yes/no questions by nodding her head. However, she became agitated during care activities. The nurses’ note read, “Becomes agitated with certain aspects of care (turning, mouth care, eye drops).” Patients’ responses to care activities in this cluster were immediate and often accompanied by physiologic reactions such as tachycardia, tachypnea, and hypertension. Patients exhibited large muscle or head movements such as “thrashing” with no apparent purpose and often appeared restless. Attempts to calm patients in Cluster 2 using verbal reassurance were largely ineffective.

Cluster 3 patients exhibited greater levels of interaction, had increased periods of wakefulness, and less immediate and strong physiologic responses to care procedures than their counterparts in Cluster 2. They appeared to be able to respond to stimuli such as verbal comments or touch. Their behaviors were more purposeful, but their ability to accurately assess the meaning of stimuli was often impaired. For example, these patients were more likely to try to remove the source of discomfort (e.g., “pull at lines and tubes”) or attempt to flee the situation (“legs over siderails”).

Cluster 4 patients were the most interactive; they were able to communicate wants and needs effectively and appropriately, most often by nonvocal methods. They reacted more calmly to tactile or verbal stimuli and were more cooperative with care. In fact, several patients in this group were able to express preferences for daily care activities. At times, they admitted to inaccurate perceptions of the environment and to experiencing delusions or altered thought processes. Over time certain stimuli induced anxiety because patients anticipated discomfort based on memories of prior encounters. For example, one patient described disturbing

aspects of respiratory distress that persisted even after he was extubated. "I actually still have that fear of choking. And not being able to get enough air. That was always in the back of my mind." Verbal strategies to reassure or calm were more successful when applied to patients in Cluster 4.

Model Development

We developed the Anxiety – Agitation in Critical Illness Model (Figure 3) to illustrate the process of anxiety - agitation symptom recognition and management in critical illness based on findings from this study. Interaction was identified as the core process. In this model, a stimulus or stimulation is the causal condition for anxiety and agitation events. Cognitive appraisal of the stimulus determines the individual patient's response which is dependent on the patient's level of interaction. The patient's response occurred in three dimensions – physiological, psychological, and behavioral. Physiologic responses included vital sign changes. Psychologic responses involved emotions or cognition and included (but were not limited to) anxiety, fear, and anger. Behavioral responses involved movement and included restlessness and agitation. Anxiety and agitation overlapped when agitation occurred as an extreme behavioral manifestation of anxiety. Restlessness occurred as a less severe sign of anxiety.

Clinician instituted management strategies to prevent, relieve, or control anxiety and agitation based on their assessment of responses exhibited by the patient, attributions about anxiety and agitation, and "knowing the patient". Interventions removed or modified the stimulus for anxiety or agitation or modified patients' appraisal of the stimulus.

Stimulus—We considered any occurrences reported verbally or documented as preceding episodes of anxiety or agitation as stimuli. Agitation and anxiety occurred in response to an irritating or uncomfortable stimulus and/or an attempt to remove/relieve this stimulus. An MD described reasons critically ill patients become anxious. "They're agitated because they're breathing rapidly and shallowly because they have horrible lungs and they are in distress."

Many common care interventions, such as position changes, dressing changes, and suctioning were identified as stimuli. The nurses' notes often described care activities as the stimulus for agitation: "agitated with care", "agitated with assessment", or "resists care". Other stimuli commonly associated with agitation included physical restraints, endotracheal tubes, nasogastric tubes, intravenous lines, urinary catheters, or rectal tubes. One MD said, "So they start waking up, but all they're aware of at first is that they're very uncomfortable and that they're tied down in bed. So, that would seem to make anyone agitated." An RN described agitation in the clinical record, "With light tactile stimuli, patient arouses and becomes very agitated with constant grimacing and pulling at restraints; acute tachycardia and hypertension observed." Another RN described the patient's response to a position change, "When I put the head of bed up [position change] and it wasn't even to the full 45-degree angle, she was crying, became too anxious."

Patients described mechanical ventilation and the experience of having an artificial airway as stimulus of anxiety. Patients and families attributed patient anxiety to worries about breathlessness, choking, being left alone, or encountering caregivers who were considered "mean" or impatient as described in the following patient exemplar.

"I basically felt totally helpless. What is going to happen if I can't get my next breath and so that's what's going through my head. I guess I just pass out and start to breathe out of my mouth. That was my greatest concern about if they were out in the hall or whatever; you know maybe not paying attention to me."

Another patient described the effect that bathing (stimulus) had on his efforts to maintain an effective breathing pattern. “Once I got it [effective breathing pattern] anything that would interfere would make me go back to panic. Like washing.”

Ventilator dysynchrony and cough also stimulated fear and panic, as described in the following patient’s account that repeated episodes of ventilator dysynchrony led to the emotional response fear and panic. The patient said, “It was the choking back up. I was scared to death of that. That backing up, I couldn’t control the choking.” A patient’s father recalled repeated episodes of ventilator dysynchrony, “He wanted to breathe faster than the ventilator would allow him. That was causing him anxiety too”. A spouse described her husband’s response when the family left the room, “When we left he was in a panic situation. He didn’t know where he was.”

Clinicians attributed visits by family members as stimuli that produced or reduced anxiety. Visits were viewed as producing anxiety when families overreacted to changes in the patient’s condition or overstimulated the patient. For other patients, the presence of families was considered therapeutic, calming and reassuring. Families who were able to be “part of the process” were viewed by clinicians as valuable components to managing anxiety or “a partial care provider”. Families who approached the bedside with “unreasonable” expectations, were overly vigilant or were “unable to handle the stress of the room” were viewed as contributing to the patient’s overall stress and anxiety. Two RNs described their thoughts about how some families contribute to the patient’s anxiety, “She [patient] always has a bad day when her husband’s here,” and “They might be the type of family member that gets their patient all worked up.”

Patient appraisal

Interaction was the basis for patients’ ability to process and appraise the nature of the stimulus. Patients’ ability to mount an effective risk appraisal was often impaired by cognitive and perceptual dysfunction that accompanies critical illness. When patients could not engage in appraisal, their response to the stimulus was limited to physiologic arousal, e.g., vital sign changes, movement.

Patient responses

Physiologic responses—Clinicians considered vital signs as the most significant evidence when determining whether the patient was anxious. Physiologic cues included a change in vital signs such as tachycardia and tachypnea, or coughing and were often accompanied by movement as described by the following MD, “You sort of have to go by his heart rate and other factors to figure out whether he’s anxious or if he’s in pain”. A nurse’s note described a variety of physiologic and behavioral cues used to determine anxiety, “Patient attempting to sit upright in bed and pulling off EKG leads. Systolic blood pressure 178/81 with heart rate 120. Ativan 4 mg IV given and effective for anxiety control.” RNs attributed vital sign changes as indicative of anxiety, when patients had decreased ability to demonstrate behavioral cues (movement) as seen in the following quote from an RN caring for a less interactive patient. “He seemed pretty calm but about 2 hours into the wean (ventilator weaning trial) his heart rate and respiratory rate went up so I gave it [anxiolytic] cause I thought he was anxious.” They often gave priority to particular vital signs such as heart rate or used vital signs as the sole indicator to intervene with anxiolytics or analgesics. An RN noted in the record, “Patient tachycardic, heart rate 160’s-180’s. Doppler blood pressure 140’s –160’s. prn Ativan and prn fentanyl given without significant change.”

Behavioral responses—We classified patient movement on three dimensions: (a) Purposeful – non-purposeful; (b) Safe – unsafe; and (c) Intensity. The patient’s behavior and movements provided cues to distinguish between anxiety and agitation. The behavioral signs of agitation-anxiety included certain body movements such as tensing facial muscles, grimacing, wincing, withdrawing, resisting care, restlessness, and thrashing. The RN in the following example described how she would interpret signs of anxiety.

“How would I diagnose the restless, the anxiousness? Pretty much if their blood pressure’s okay and their sats (oxygen saturation) okay and for some reason they just can’t sit still or they’re just constantly like up and down and can’t get comfortable and maybe those are reasons why it’s making their heart rate and respiratory rate a little bit better, a little bit faster or whatever. You might just think, well, maybe they’re anxious.”

Patients demonstrated behaviors on a continuum from little or no movement, to large muscle movement (agitation). Some patients became detached and withdrawn, with little movement, and decreased responses. This response had a negative effect on ventilator weaning. An RN described this decrease in patient response in the chart, “Patient appears more drowsy and a little withdrawn than earlier in the week, as well as more anxious about weaning off the vent/breathing. Patient states that he ‘doesn’t want to die’.”

Intensity of movement was a distinguishing criterion for agitation. Clinicians viewed movement associated with agitation as the most dangerous because it often involved large muscle groups. Examples included attempts to sit up in bed, kicking legs or banging on the siderail. Clinicians viewed movement involving smaller muscle groups as less dangerous. Examples included picking at sheets, grimacing or rhythmic head movement. These movements were often isolated descriptions in the clinical record or were associated with descriptions of “restlessness.” Restlessness was a less intense, less dangerous form of agitation.

Psychological responses—Psychological responses associated with anxiety included fear, frustration, anger and withdrawal. RNs interpreted patients’ emotional responses to stimuli such as crying and changes in facial expression as anxiety and described these events in nursing notes as “Patient anxious and crying” and “Patient became very emotional. Crying and very anxious.” An RN described her ideas of why the patient was anxious, “He’s frustrated with communication and depressed. He’s been here a long time.”

Occasionally patients became angry to the point of agitation. In the following example, the patient became angry with his wife’s inability to carry out his wishes. The wife stated, “Well, right now he is very mad at me ‘cause I can’t take him home. He wants to go home. So he is mad at me right now. But that is ok. It is just a response.” The patient in the following example was angry and upset during a complex dressing change. Her stay had been lengthy and difficult. An RN stated, “Yesterday, we turned her to do her dressing change and she got wild. She was pulling at her trach. She was angry. She actually started to bleed from her trach. I gave her some sedation but it didn’t really hold her.”

Clinician Assessment

Clinicians observed and interpreted patient responses (physiologic, behavioral, psychological) to formulate their assessments and select interventions. When patients were unable to communicate, clinicians looked for other cues or signs to make judgments about their responses and guide clinical management. One RN described questions she asks when trying to discern the meaning of these signs,

“I react based on how the patient responds. You know you can read different things. Are they agitated? Are they hyperactive? Are they calm? Are they too calm? Are they lethargic? You know you just watch the patient, watch the vital signs.”

They also used knowledge and interpretation of the patient’s responses to inform their decisions about recognizing and managing anxiety and agitation. Clinicians’ attributions about anxiety and agitation contributed to their assessment. The following sections describe how “knowing the patient” and clinicians’ attributions for anxiety and agitation contributed to their assessment and choice of interventions.

Knowing the patient—“Knowing the patient” refers to familiarity with the patient’s typical response and preferences. Usually, clinicians relied on their knowledge of the patient’s unique history and responses to guide actions. Clinicians also relied on what they learned about the patient from past assignments (continuity), remembering which strategies were successful and which to avoid. Many times, clinicians took steps to avoid situations believed to induce the causal condition or stimulus in a particular patient.

Clinicians shared information about patient’s anxiety and agitation formally during clinical hand-offs, through written progress notes and care plans and informally through conversations with family members. Clinicians used this information used to plan individualized interventions. An RT described interdisciplinary communication that results in coordination of care,

They both (RNs and RT’s) need to be in tune as to where the process is because if they’re not then it ain’t going to work, i.e. if there is mild sedation that may be required obviously it has to be coordinated with the nursing personnel.

An RN recorded information sharing in the nurses’ note, “Patient appears to be slightly calmer. Report forwarded to dayshift nurse.”

Clinicians used information (actual or assumed) about patient’s premorbid anxiety or temperament to identify the symptoms the patient was exhibiting. For example, when analyzing a patient’s heart monitor strips, an RN observed, “Nothing is working, his heart rate is not decreasing, he’s probably a nervous guy”. Clinicians perceived a relationship between history of anxiety disorders or anxious temperaments and risk for continued anxiety. Clinicians also attributed anxiety to particular chronic disorders such as COPD, and used this “patient knowledge” to predict how a patient would respond. This is exemplified in quotes from two different RNs, “It is being in a unit like this with chronic lung patients who have a lot of anxiety, who have a lot of difficulty calming themselves.” and “Typically with chronic lung patients, there comes a chronic family. It’s chronic anxiety.”

Clinicians often relied on the family to gain a better understanding of the patient as this RT describes, “Sometimes I’ll ask a family member you know what their personality is. And the family members will say ah well you know she’s never been one to sit down or you know I’ll ask the family members.”

Attributions—Clinicians offered two competing explanations or attributions for anxiety and agitation. We used dialectic inquiry to explore these conflicting stances or attributions. The two opposing attributions that contributed to clinician assessment were discrimination vs. generalization and expected response vs. character flaw. Dialectics exemplify the difficulty of determining what influenced behaviors in the context of critical illness where patients are unable to communicate their feelings and emotions. These attributions contributed to differences and inconsistencies in assessment and choices for intervention.

Discrimination vs. generalization—Clinicians cited “anxiety” as the cause of many patient responses outside the norm of calm and cooperative without regard for other explanations. The term, “delirium,” was not considered nor used by bedside clinicians (RNs and RTs) and rarely used by MDs to describe behaviors. In these instances, “anxiety” might have been used as a catchall, general term. Conversely, clinicians also demonstrated efforts to discriminate anxiety from other symptoms, such as pain, dyspnea or fatigue. In these instances, clinicians explored symptoms of anxiety and agitation by considering a broader range of potential explanations. In one instance, a patient was “anxious” and demanding for days. The RT noted a pneumothorax on a chest x-ray report which explained and validated the patient’s anxiety. This RT sought other explanations for the patient’s behavior and did not accept labeling the patient as “anxious”.

Signs of anxiety mimic other psychological symptoms frequently experienced in the ICU such as delirium, pain or frustration with communication and can make accurate interpretation difficult. Clinicians acknowledged this difficulty in sorting out the meaning of overlapping signs as this MD described, “Even in a patient who can speak to you, trying to sort out pain and anxiety acutely, not having a long-term relationship with the patient is very difficult.” When asked how she discerned agitated delirium from anxiety, a nurse stated with a slight laugh, “I don’t know if you can.”

In summary, these opposing views occurred within and across cases and within individual clinicians. Although some clinicians were more prone to generalize, clinician efforts to discriminate were evident throughout the data and within and across clinicians.

Expected response vs. character flaw—The view of anxiety-agitation as an “appropriate” response was strongly endorsed by some clinicians. This view was apparent in the previous exemplars regarding the physiologic stimuli for anxiety-agitation as in this quote from an MD, “They’re agitated because they’re breathing rapidly and shallowly because they have horrible lungs.” Clinicians generally acknowledged that endotracheal tube discomfort and physical restraint “would seem to make anyone agitated,” according to one MD. Others viewed anxiety-agitation as a personal deficit or a perception that could be willed or controlled. An RT described anxiety as precipitating a negative cascade of physical disturbances, “Anxiety in the brain is a powerful thing because I’ve also seen it cause hypoxia, tachycardia and just whirlwind downhill.” An RN said, “You want them awake to wean but then sometimes when they’re awake they can be more anxious. I really think that’s the patient personality. You know, their perception of what’s going on is the biggest barrier for them.”

The belief that anxiety was within patients’ control seemed to arise from interactions with patients who were having difficulty weaning. Some clinicians believed if patients really “wanted” to wean, they could exert the self-control necessary to overcome feelings of dread and anxiety. Clinicians viewed this lack of control as a character flaw or weakness, and described some patients using terms such as “wimpy” and “lazy”. An RN described anxiety in the patient as an innate part of the patient.

“When they’re having an anxiety attack because they get that little twinge of not being able to breathe and they don’t try and bring themselves back down. It’s really not any kind of oxygen hunger. It’s really not carbon dioxide related. It’s just them.”

An RT said, “I think if he has a way of controlling his anxiety, he can wean. I really think he [emphasis added] just needs to get the anxiety under control.” Another RT thought a patient’s anxiety prohibited effective weaning, “Physically he could [wean] it’s just mental with him...he’s crazy.” An experienced MD thought this perspective was misguided and

expressed concern, “The context of anxiety is that it’s some sort of pathologic state of the patient that they should be able to control if they were a stronger mental human being. That’s why I don’t like the term.”

Managing Anxiety and Agitation

Non-pharmacologic interventions—Symptom management included both pharmacologic and non-pharmacologic interventions. Interventions to manage anxiety involved removing or modifying stimuli. Distraction was a common strategy to disengage negative thoughts (cognitive appraisal) that contributed to fear and anxiety. The cognitive effort necessary to attend, listen, and respond distracted the patient from the negative appraisal of stimuli. Sometimes this was accomplished by simple conversation with the patient about topics outside the patient’s environment. Families and clinicians initiated distracting talk regardless of the patient’s ability to fully engage in these conversations. For example, a sister visiting a restless patient noted the patient’s nail polish, “Your nails need a good soaking. They look pretty though.” She also talked about a change in season and a family member who had visited. A RT talked about choices in television programs to another patient who was weaning.

“The television, do you watch soap operas? Do you want a movie? Yes. Oh, this is a good show. It’ll make you laugh. Just give it a shot. Do you want me to decrease the lights? How’s that? It’s a little intense. You don’t need a sunburn. (Referring to TV program Animal planet. A dog) I used to have a dog that looked like that.”

Clinicians and family members used music in more than half of the cases to reduce anxiety. Patient’s families brought selections that matched the individual’s taste and they were more likely than clinicians to use music as a source of relaxation and distraction. Clinicians acknowledged music selections and used it as a non-clinical conversation topic but did not suggest that families bring music nor did they turn on music to manage anxiety. Patients admitted that certain types of music helped create a calm, relaxed state. In one case, the family put headphones on the patient so he could listen to music and said they thought it would help him to relax. Another patient who typically listened to 60’s music chose classical music specifically to calm himself.

If the patient was able to interact, clinicians initiated interventions that included verbal reassurance, redirection, reminders and warnings. If the patient was minimally interactive, interventions involved less verbal communication. Less interactive patients were more often physically restrained when exhibiting behaviors viewed as unsafe.

Clinicians employed verbal strategies which focused on patient progress. We classified verbal strategies as reassurance, encouragement, or coaching. We defined reassurance as nonspecific conversation about progress and future wellbeing. Reassurance was a form of verbal encouragement and support designed to assist the patient (a) to become more confident, (b) to feel safe, and (c) to dispel patient’s fears. A family member observed, “The nurses basically were telling (the patient) right along that it’s (ventilator) just a temporary thing and as soon as she gets stronger, she’ll all be taken off. It [the ventilator] probably is a little scary at first.”

The following is an example of communication from a nurse reassuring a patient that she would stay in the immediate area until the patient was less anxious. The patient was frantic after being suctioned, fearful that he wasn’t getting enough oxygen. The goal for this interaction was to increase feelings of patient security. The nurse looked at the patient directly and said, “We’re out here in the hall and we won’t leave until you’re totally okay.”

An RT offered reassurance to a patient, upset after a social worker told her of plans for a transfer to a weaning facility,

“You’re looking good. Your x-ray looks good. You have a lot of potential, [patient name]. Right now you need to get people to work with you, with your whole body. Think about it. One thing you have going for you is your age.”

Another patient who had been told that she would never wean from mechanical ventilation described the contribution encouragement from respiratory therapists made to her overall recovery. “They explain things really well. They’ve been real straight with me. [RT name], he’s been all happy, very encouraging. Here I was told I would never get off the vent but he’s good with that.”

We defined coaching as a deliberate set of verbal cues designed to instruct the patient on the “right way” to perform a function such as breathing. It included efforts to redirect the patient as illustrated by this RT, “Deep breath [patient’s name], one more. Good! All done.” Families engaged in coaching to assist their family members with breathing difficulties most often. A mother described her efforts to coach her son who was experiencing ventilator dysynchrony,

“But I just grabbed hold of both of his hands with all my strength and I kept trying to get him to breathe evenly, you know. I said, ‘Breathe with me. We did this before a long time ago when I was having you. Let’s breathe together.’ And he eventually did slow down somewhat.”

Pharmacologic interventions—Of the 30 patients, 29 received at least one dose of sedation or analgesia. Sedation was used to dampen the physiologic response that typically accompanies anxiety, i.e., to lower blood pressure and/or pulse. In this case the referent stimulus is ventilator weaning. One MD indicated the need for sedation,

“There will be certain patients whose stress of spontaneous breathing is going to be so high that you need to regulate it. You need to regulate the (tachypneic) sensation that they’re getting which is exceptionally real, not an inappropriate reaction to weaning.”

This ICU had not adopted sedation protocols at the time the study was conducted. Clinicians based sedation management on trial and error; their sedation practices appeared to be random or focused on convenience. An RT said, “It’s [sedation management] very patient dependent. You have to know what’s going on with the patient. There’s no science. You just try it and see what happens as long as everything is okay.” Some tried verbal strategies as the initial intervention, whereas others chose sedation. An RN stated, “You might just think well maybe they’re anxious. Maybe if we try a little something [sedation], see if that calms them down and then if it doesn’t then say well maybe it is the wean.” In the following quote, an MD described trying to decrease a patient’s anxiety and increase cooperation indicated the first choice was to talk with the patient.

“Well usually I do it [talk] unless it’s 3 in the morning, then I just push drugs. Usually when that fails then I’ll do a Fentanyl challenge. I’ll usually ask the nurse to give a fairly nice dose of Fentanyl and see if that evens out their breathing.”

The availability of medications and the immediacy of response was an attractive solution when vital signs exceeded a safe range or comfortable threshold for nurses. Clinicians characterized sedation administration as a timesaver; non-pharmacologic interventions took more time. An RN said, “I say that after a while dealing with someone who’s anxious you want to medicate them rather than take the long way out.”

Sometimes clinicians did not administer PRN (“as needed”, discretionary) sedation in a deliberative fashion. In the following exemplar, the interviewer debriefed the nurse and RT after a difficult weaning trial. The RT discontinued the weaning trial because the patient became agitated and had changes in his respiratory rate and effort. In response to the observer’s question whether the patient received sedation to treat agitation, the RT nervously looked at the nurse who responded, “No, he didn’t get anything but he can have Ativan. Let me know before your next wean and I’ll give him something.”

Clinicians held widely varying and conflicting views on the best strategies to achieve comfort and calm while maintaining the patient in a wakeful, interactive state. The following is a discussion with two nurses who disagreed with modifications to sedation orders given by the nurse practitioner (NP).

Nurse1: The anxiety is out of control. The NP won’t let us give her anything. (RN1 makes a face.) She (NP) doesn’t want her snowed.

Interviewer: Then what did you do for it?

Nurse2: Oh, 4 mgs of morphine and just one (mg) of Ativan. Plus, she had her Oxycodone but that’s not enough Ativan.

(Both nurses are shaking their heads at the Ativan dosage.)

The following exemplifies a very heated interaction between a nurse and two resident MDs captured in a field observation. The patient was thrashing in bed, was hypertensive and had bloody secretions.

Field Note: The nurse was saying that the patient needed sedation. The resident must have smiled or laughed.

RN: You laugh, sedation is important! She’s been thrashing. She’s on a 100% FiO2 and she’s hypertensive.

Resident MD: Give her five of Haldol.

RN: Five (mg) of Haldol, don’t waste my time!

Clinicians administered anticipatory sedation prior to care activities to prevent anxiety or agitation. An MD described positive patient responses to pre-medication in the following quote. “The nurse said yesterday that she premedicates him [with an anxiolytic] before care. So if you can anticipate things, then his heart rate won’t go up”

Patients described the positive effects that anxiolytic medications had on anxiety. Patient 1 said, “I got everything I need, nice medicine to calm me down, the pillows where I need so I’m not in aching pain. So those things come from God the things that bring comfort.” Patient 2 said, “The fellow seen that [panic during ventilator weaning]. He started giving me the Serax.”

Discussion

We used novel methodology to study anxiety and agitation in critical illness and came to several unique conclusions. Unlike other studies (Bergbom-Engberg & Haljamae, 1989; Rotondi, et al., 2002), sources of data included the experience of patients with varying neurocognitive states and patients who did not survive their critical illness. We employed multiple data sources including observations and debriefing proximal to the anxiety or

agitation event. Most interviews with patient participants took place while the patient remained in the ICU, an important consideration because patients' memories can be distorted or lost over time and the amnesic effects of sedatives (Samuelson, Lundberg, & Fridlund, 2006). This study gave a voice to nonspeaking patients who described instances of fear and panic during mechanical ventilation and critical illness. We included patients despite the severity of their illness or impaired verbal communication in an attempt to provide more comprehensive understanding of the experience of anxiety and agitation.

We developed the Anxiety and Agitation in Mechanical Ventilation model (Figure 3) based on our analysis. It is unique in depicting the complex, multidimensional features of anxiety and agitation recognition and management and incorporates patient and clinician perspectives. Our model is compatible with the Transactional Model of Stress and Coping by Lazarus and Folkman (Lazarus & Folkman, 1984) but is specific to the ICU context and unique in incorporating assessment and management by clinicians. The human interaction between the clinician, patient and others is integral for understanding and explaining identification and management of anxiety and agitation in mechanically ventilated patients. We incorporated considerations related to cognitive and perceptual ability that fluctuate during the course of critical illness into the model.

Our findings support the value of "knowing the patient" which enables clinicians to interpret the response and choose individualized interventions (Tanner, Benner, Chesla, & Gordon, 1993). Processes that clinicians used to gain knowledge of patients in this study were similar to those described by James, Andershed, Gustavsson, and Ternestedt, (2010). Clinicians in both studies used observations of patients as well as secondary sources like families, hand-off reports or written notes to construct their knowledge of the patient. Clinicians in our study used their knowledge of previous patients to predict patient responses. James, Andershed, Gustavsson, & Ternestedt, (2010) also describe a process called "reconsidering pictures" in which nurses compare current patients to similar patients with whom nurses have had previous experiences. Nurses in both studies used information to predict patient responses and plan interventions or stay "one step ahead" as described by James, Andershed, Gustavsson & Ternestedt (2010). Because our study was conducted in an ICU, clinicians' relied on technology mediated surveillance and monitors to extend their knowledge of the corporeal patient and knowledge gained from questioning patients with decreased levels of consciousness was much less than in the study by James, Andershed, Gustavsson, & Ternestedt, (2010).

Clinicians used attributions about whether patient responses were purely physiologic or emotional agitation to guide choices of management strategies. By using dialectic inquiry, clinician attributions about anxiety expose contradictory views that coexist in practice and within individuals. These views have not been described in the literature. In the first dialectic, discrimination vs. generalization, we describe opposing clinician symptom assessment where some clinicians approached patient responses with a singular causal view while other clinicians viewed patient responses as having multiple possible explanations. None of the patients used the word "anxiety" to describe their experiences while clinicians used "anxiety" to describe a wide range of patient responses. This generalized use of the term "anxiety" might have provided a basis for intervention and common understanding among clinicians who were able to manage anxiety more easily than "fear".

In the second dialectic, expected response vs. character flaw, clinicians assumed a more active management stance when they viewed anxiety as an expected response from common ICU stimuli. In contrast, the view of anxiety as a character flaw restricted clinician management options as preexisting patient characteristics cannot be reversed during critical illness.

We provide a comprehensive picture of non-pharmacologic strategies used by clinicians and families to manage anxiety in the ICU. Our analysis confirms a link between isolation and anxiety and agitation. Further work is needed to identify and test whether interventions to increase social support or presence affect anxiety during mechanical ventilation. Patients reported difficulty being left alone and associated the absence of family or clinician presence with fear. The contribution of family or clinician presence to patients' feelings of safety and security has been reported previously, however, a full explication of activities that constitute such support in this setting is lacking.

Music, present in 15 (50%) patient rooms, was mostly provided by families and used to distract or to relax the patient. Although calming effects of music were noted by clinicians in progress notes and during informal interviews, we did not observe its intentional use by clinicians despite evidence from studies (Chlan, 2009) describing the positive effects of music on critically ill patients. This is the first study to document a pattern of family initiated music as an intervention to relieve anxiety in the ICU. This is an example of the way that families might provide personalization that contributes to clinicians' ability to "know the patient".

We found tension and conflict within and between clinicians about sedation administration because clinicians were faced with the often competing clinical objectives of maintaining the patient awake and calm. Clinicians acknowledged risks of sedation yet considered anxiety and agitation as unsafe responses that necessitated interventions. This is consistent with previous findings that sedation goals often differ between RNs and MDs (Weinert, Chlan, & Gross, 2001). Decision making regarding sedation was largely left to the assessment of bedside nurses. Even in the presence of sedation protocols, studies report that discretionary nursing judgment remains a significant component of application of clinical protocols and guidelines (Weir & O'Neill, 2008). Pinpointing the exact patient state that necessitates administration of sedation is difficult because of conceptual overlap between several different patient conditions (i.e., anxiety, pain, delirium, fear). Some of the difficulties in adopting sedation protocols (Payen et al., 2007) or in making decisions to sedate patients (Egerod, 2002; Weinert & Calvin, 2007) reported in other studies might be because of this conceptual overlap or to clinician tendencies to generalize rather than discriminate causal attributions for patient responses. Efforts to discriminate cause of anxiety and agitation can be enhanced by adoption of formal delirium assessment. Clinicians can increase precision of symptom identification by employing enhanced communication with patients (Campbell & Happ, 2010). Interpretation of ventilator waveforms can be another useful tool to determine the cause of anxiety or agitation, yet it remains underutilized by RNs (Mellott, Grap, Munro, Sessler, & Wetzel, 2009).

Consistent with previous studies, patients, clinicians and families indicated that anxiety and agitation were important, distressing and difficult to assess and manage. The core process identified in this study, interaction, provided a means of distinguishing between anxiety and agitation and was frequently used by clinicians to determine the most appropriate intervention. Similarly interaction has been reported as an important consideration for nurses when deciding when to sedate or restrain critically ill patients (Aitken, Marshall, Elliott, & McKinley, 2009; Happ, 2000). Li and colleagues (2009) detected changes in vital signs and cortical arousal in deeply sedated patients when they underwent noxious stimuli (endotracheal suctioning or position changes). Similarly care activities such as bathing, position changes and suctioning were identified as stimuli preceding anxiety and agitation across all patient clusters in the present study, including those who were least responsive (Cluster 1).

As in other studies (Frazier, et al., 2002), clinicians used physiologic signs to determine the presence of anxiety. This approach is not without pitfall because conditions other than anxiety (i.e., activity or changes in intravascular fluid status) can contribute to changes in vital signs (Olson, Thoyre, & Auyong, 2007). Changes in vital signs are nonspecific and not recommended as the sole determinant of anxiety or agitation (Jacobi et al., 2002). Our clinician participants confirmed ambiguity in this approach to symptom identification.

Clinicians used multiple interventions to modify the anxiety-agitation stimulus. Clinicians applied verbal reassurance, coaching or verbal distraction frequently as first line approaches even when patients' ability to process and respond was limited. Patient acknowledge verbal strategies as helpful in other studies (Logan & Jenny, 1997) and nurses consider them as part of a range of strategies to assist patients with anxiety (Tracy & Chlan, 2011) and to prevent device disruption (Happ, 2000). Practice recommendations for anxiety – agitation management are based in part on evidence non-ICU patients. Communication difficulties and neurocognitive dysfunction in critically ill patients might make application of evidence of beneficial effects of positive verbal support from other patient populations difficult. Further work to test approaches is necessary.

Limitations

Several factors might limit transferability of study findings to all critically ill patients. Entry criteria were confined to those patients who were in their active weaning period. However, some patients returned to full ventilatory support and ventilator weaning was abandoned because their physical status changed. Our observations were longitudinal. Although we did observe patients during and outside of ventilator weaning events, anxiety and its manifestations might be different for patients who have not yet begun weaning trials. Claims of saturation would be methodologically tenuous given the inability to purposively sample additional participants. We conducted this study in a single ICU setting and single institution. Although we did seek confirmatory information from clinicians from another unit, it is unclear whether identification and management of anxiety and agitation are similar in other institutions.

Because we used an existing ethnographic dataset, the passage of time could influence the usefulness of the data and the reliability of our interpretations (Willis, 2010). During this time, critical care practice evolved including the development of clinical practice guidelines and research findings were published on topics relating to anxiety, agitation and sedation. Initially, it was not clear whether these events would outdate potential contributions of data from the primary study. The ICU in which observation took place did not have a protocol for routinely assessing level of sedation or presence of delirium or for providing daily wake up session, as currently done in many ICUs. The actions of clinicians and response of patients might differ in settings where such protocols are used routinely. Historic effects were addressed by the investigator's ongoing role from the original study and subsequent studies in critical care. Observations of clinical practice in the study unit and in other units outside of this institution indicated that implementation of recommendations from professional organizations and evidence from research findings have not been consistently codified at the institutional level nor applied at the bedside.

Conclusions and Implications

Implications for Practice

This study contributes to critical care practice in several ways. First, the model illustrates the wide range of both patient responses and clinician interpretations associated with everyday critical care experiences. Careful reflection by clinicians might reveal how knowing the

patient and their own attributions about anxiety and agitation influence their assessment and management of critically ill patients. This might enable consideration of a wider range of possible explanations for patient responses. Using this model, clinicians might also deliberately and consciously target interventions to stimulus, appraisal or response. The results might raise clinician awareness and address the American Association of Critical Care Nurses' research priority area of symptom management by pinpointing issues crucial to reliable interpretation and management of anxiety and agitation.

Implications for Further Research

Our findings provide foundation for further research of anxiety and agitation experienced during mechanical ventilation. The model developed from this study can be used to prompt further research regarding anxiety and agitation in critically ill patients. Additionally, this study might serve as a basis for development and testing of interventions to improve patient care in the ICU.

Suggestions for further work include refining operational definitions and clinician language to better discriminate between anxiety, agitation and combination states. Innovative research could test assessment – discrimination skill development using simulation scenarios and debriefing about critical observations indicative of anxiety and agitation. Studies are needed to explain the effects of nurse and family presence and clarify the effect of specific verbal support strategies for critically ill patients. Descriptive studies of sedation practices have been reported frequently yet acceptance of sedation protocols continues to vary across settings. Further work is necessary to explore the process clinicians use to assess the need for sedation through observation and debriefing of clinicians and patients. (“ATLAS.ti,” 2009; James, Andershed, Gustavsson, & Ternstedt, 2010; Morse, 2010) (Li, Miaskowski, Burkhardt, & Puntillo, 2009)

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Figure 1.
Graphic display of patient responses and interventions for 24 hour period

Figure 2.
Patient clusters based on interaction

Figure 3. Anxiety Agitation in Mechanical Ventilation Model

Table I**Patient Characteristics**

N = 30	Mean (SD)	Median	Range
Age (years)	59.5 (17.64)	59.5	25 – 87
Severity of Illness APACHE III*	58.5 (19.58)	54.0	19–106
Glasgow Coma Score	11.93 (3.07)	13.0	5-15
Hospital Length of Stay in days	76.5 (163.0)	32.0	7 – 876
ICU length of stay in days	47.5 (63.0)	30.0	7 – 350
Duration of mechanical ventilation in days	67.8 (164.6)	28.0	5 – 875
APACHE – Acute Physiology and Chronic Health Evaluation			
	N (%)		
Female Gender:	16 (53)		
Ethnicity:			
African-American	4 (13)		
White	26 (87)		
Primary Medical Diagnosis:			
Cardio-pulmonary	17 (57)		
Surgical complication	5 (17)		
Cancer	3 (10)		
Neuromuscular	5 (17)		
Hospital Discharge Disposition			
Home	8 (27)		
Long Term Care	12 (40)		
Long Term Acute Care	2 (7)		
Other	3 (10)		
Died prior to discharge	5 (17)		

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