

**BURNOUT AMONG CRITICAL CARE NURSES AND THE ROLE OF ICU
TELEMEDICINE**

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ABSTRACT

OBJECTIVE: Nurses are hubs of patient care in Intensive Care Units (ICUs), yet they are prone to burnout because of job stressors and complex organizational environments of ICUs. Burnout is a state of mental, physical, and emotional exhaustion caused by prolonged exposure to stress in the workplace. The public health relevance of this work is changing patient demographics and staffing shortages increase nurses' strain, yet few evidence-based interventions targeting burnout in this population exist. ICU telemedicine, audiovisual technology to remotely provide critical care services, is designed to alleviate resource deficits in ICUs for better patient care; it may impact burnout in critical care nurses. This research explores critical care nurses' perceptions of burnout and the role of ICU telemedicine in burnout, as well as relationships between characteristics of nurses and modes of support offered by telemedicine.

METHODS: This study includes 118 critical care nurses who completed semi-structured interviews and demographic questionnaires in a study about ICU telemedicine. ICU and telemedicine unit directors completed a questionnaire about unit characteristics. Content analysis was performed on interview data; descriptive statistics and Chi-square analysis was performed on quantitative data.

RESULTS: Nurses reported that burnout felt like overwhelming stress and disengagement, and common coping strategies were voicing concerns with coworkers and seeking employment outside the ICU. Nurses cited moral distress, compassion fatigue, physical difficulties, interactions with physicians, and tasks that take them away from the bedside as common determinants of burnout.

Nurses noted that ICU telemedicine can support new ICU nurses, as well as older nurses no longer able to work there by providing another mechanism for delivering patient care. Telemedicine also contributes informational and instrumental support for bedside nurses.

Moderate associations were found between types of support offered by telemedicine and characteristics of nurses and their workplaces. Nurses with more knowledge of and interaction with the telemedicine unit were more likely to endorse it for support.

CONCLUSION: ICU telemedicine can potentially alleviate burnout among critical care nurses. Organizations implementing ICU telemedicine should develop programs that enhance types of supports valued by nurses, such as mentoring, career transitions for older nurses, and instrumental support.

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PREFACE

This work is the culmination of a long journey, and I am extremely thankful for the friends, family, and colleagues who have walked beside me and offered support and reassurance. I made this journey through a number of major life events and could not have made it without those that believed in me.

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1.0 INTRODUCTION

Intensive care units (ICUs), hospital units for patients with life-threatening illnesses and injuries, are complex, challenging work environments. They are staffed with multidisciplinary teams, including critical care trained physicians, also known as intensivists, and nurses, respiratory therapists, and pharmacists. Patients in ICUs require frequent, active monitoring and often have emergent clinical needs that require rapid response and decision making from the ICU team. The number of ICU beds in the United States is growing and because of the changing demographics of the population and increasing numbers of patients who are older and who have more complicated medical needs are being admitted to ICUs (Halpern et al., 2004; Ward & Chong, 2015). In addition, there is a critical care workforce staffing shortage (Ward & Chong, 2015). ICUs with greater intensivist presence and lower staffing ratios are associated with better patient outcomes, including lower infection rates and mortality, yet in an era of resource constraints, many ICUs are unable to comply with evidence-based staffing models (Hugonnet et al., 2004; Tourangeau & Cranley, 2006; Cimiotti et al., 2012). This discrepancy places a strain on an already strained workforce.

Complex patient care takes place in a challenging organizational climate. Nurses who work in ICUs are faced with stressors from a number of sources. High patient needs and staffing shortages contribute to heavy workloads. Death and dying are also common in the ICU, exposing nurses to potentially morally distressing situations as they manage the often conflicting wishes of

patients, families, and physicians (Duxbury et al., 1984; Embriaco et al., 2007). ICU nurses can also operate under conditions of role ambiguity, which is when workers are unclear or uncertain about their role in the workplace; poor communication among coworkers; inadequate resources; and lack of authority, which is the absence of the ability to make decisions in the workplace and the freedom to act according to one's professional knowledge base (Gray-Toft & Anderson, 1985; Laschinger & Leiter, 2006). Evidence links these conditions to poor outcomes, including decreased patient and staff safety and increased infection rates, patient mortality, and nurses' intention to leave their jobs (Tourangeau & Cranley, 2006). Poor organizational climate is also associated with increased stress and depression in nurses and leads to burnout (McCranie et al., 1987; Chlan, 2013).

Burnout is a state of mental, physical, and emotional exhaustion caused by prolonged exposure to stress in the workplace. In medical settings, it leads to suboptimal patient care and outcomes, as well as negative consequences for nurses and the nursing workforce. Burnout has been well documented and studied among ICU nurses, yet evidence-based interventions are lacking. Furthermore, these interventions have typically been targeted toward the individual nurse and not to the organizational environment that leads to the burnout (Felton, 1998; Awa et al., 2010). Without evidence-based interventions to modify the hospital or ICU system, burnout is likely to increase. This increase, combined with staffing and resource shortages, will hasten negative effects on the ICU nurse workforce and patients unless more work is done to address the organizational climate of the ICU to better support nurses.

ICU telemedicine is an approach that may have a role in the prevention of burnout of ICU nurses. Conceived as a way to leverage ICU resources, ICU telemedicine has the potential to

provide support to bedside nurses by increasing evidence-based staffing and assistance in the care of critically ill patients.

This chapter provides an introduction to critical care medicine and describes the transforming landscape of the field, including changing patient demographics and workforce shortages. Chapter 1 continues with a description of the organizational climate of the ICU and the ways in which it is detrimental to staff and patients. This chapter also discusses burnout among critical care nurses, including its predictors, a model for its development, and existing interventions. Finally, ICU telemedicine is described, as well as its potential role in burnout.

Chapter 2 details the methods for ConnECCT the parent study from which these data come, as well as the particular methods for further analyses for this paper. Chapter 3 describes the results of the qualitative analysis, including nurses' perceptions of burnout, the determinants of burnout, and the ways in which ICU telemedicine has a role in burnout. Chapter 3 also presents the results of the quantitative analysis, including correlations between nurses' demographic and workplace characteristics and their endorsement of types of support provided by the telemedicine unit. Finally, Chapters 4 and 5 provide a discussion of the results and conclusions, respectively. The conclusions include recommendations for future research and for practice.

1.1 BACKGROUND

1.1.1 Understanding Critical Care

1.1.1.1 Critical Care Medicine and Intensive Care Units

Critical care medicine is the branch of medicine that is concerned with diagnosing and treating life-threatening conditions, such as acute renal failure, cardiac arrhythmias, and multiple organ failure. Patients treated for these conditions often have the highest illness acuity, require invasive monitoring and organ support, and have increased risk for poor outcomes. Hospital care for these patients takes place ICUs, sometimes known as critical care units (CCUs). These are distinct units used to provide the specialized, multidisciplinary services needed to care for patients with complex medical needs and may be further divided by specialty, such as surgical intensive care units (SICUs) or medical intensive care units (MICUs). Because ICU patients have complex needs, they may require medical devices, equipment, and interventions, including mechanical ventilation for respiratory support, broad spectrum antibiotics, urinary catheters, and hemofiltration equipment for renal failure.

Nearly six million patients are admitted to ICUs every year in the United States (Society for Critical Care Medicine, 2016). The most common reasons for admission include monitoring, airway and breathing support, comprehensive illness or injury management, and stabilization for life-threatening conditions (Society for Critical Care Medicine, 2016). The number of ICU beds in the United States has grown dramatically in the past 50 years, despite the recent trend to limit hospital size (Ward & Chong, 2015). Between 1985 and 2000, the number of hospital beds in the United States decreased by 26%, yet the number of ICU beds grew by 26% (Halpern et al., 2004). Between 2000 and 2005, the number of ICU beds in the United States increased by another 6.5%,

with a significant increase in the number of ICU patient days and annual critical care expenditures (Halpern et al., 2013). In the United States, the average length of stay (LOS) in an ICU is 3.8 days, yet this number can vary widely with diagnosis, comorbidities, and organizational factors, such as unit staffing (Logani et al., 2011).

1.1.1.2 Intensive Care Unit Staffing

ICU physicians are known as intensivists and, in the United States, receive additional fellowship training and board certification in critical care medicine. ICU nurses also receive further advanced training and credentialing in critical care. The core team in the ICU is often considered to be the nurse, physician, and respiratory therapist. Other members of interdisciplinary critical care teams include pharmacists, physician assistants, physician trainees, nurse practitioners, and care managers. These teams expand and contract as needed for patient care (Despins, 2009).

As noted above, LOS may vary with unit staffing characteristics. One of these characteristics includes a high-intensity model, which specifies that ICUs should have an intensivist present during daytime hours caring solely for ICU patients. In addition, the intensivist must be available by telephone or page and should arrange for an advance practice provider to be at the ICU within five minutes when needed (Logani et al., 2011). The high-intensity staffing model has been associated with decreased patient LOS, decreased mortality, and increased cost-effectiveness in care (Logani et al., 2011). Nurse staffing is also a key aspect of ICU patient care. These patients require technological support and frequent assessments, so nurse-patient ratios are much lower than on the regular units, also known as “the floor.” In the United States, nurse-patient ratios are 1:1 or 1:2 in the ICU, compared to the typical 1:8 or 1:12 ratio on the floor (Sakr et al., 2015).

Studies have examined the impact of nurse staffing ratios on general hospital patient outcomes, and many of them have demonstrated an inverse relationship between patient outcomes and nurse-patient ratios. One study by Needleman et al. (2002) determined that medical and surgical patients who received more hours of care by registered nurses (RNs) had lower mortality rates and fewer complications, including urinary tract infections, cardiac arrest, and failure-to-rescue, which is a clinician's inability to save a patient's life after a complication. Aiken et al. (2002) examined the effect of staffing ratios on outcomes for general, orthopedic, and vascular surgery patients. They determined that each additional patient per nurse correlated with a 7% odds ratio for the likelihood of death in the 30 days following hospital admission and a 7% increase in the odds for failure-to-rescue (Aiken et al., 2002).

Similar studies of critical care nurses and patients have had mixed results, likely because of inconsistent definitions of staffing and because patient mortality is not always risk-adjusted. Dimick et al. (2001) examined outcomes for a group of hepatic resection patients and determined that a nurse-to-patient ratio of 1:3 or higher was associated with increased risks of respiratory failure and reintubation compared to 1:1 and 1:2 nurse-to-patient ratios. Sasichay-Akkadechanunt et al. (2003) analyzed the relationships between the ratio of nursing staff to patients, the proportion of RNs to total staff, and the percent of Bachelor of Science in Nursing (BSN) prepared nurses to inpatient mortality for hospitals in Thailand. Of these factors, only the nurse-to-patient ratio decreased inpatient mortality. The results of this study, however, may not be generalizable to the United States, as the ICU workforce in Thailand has not been well studied, and fewer ICU nurses in Thailand are critical care certified, compared to their counterparts in the United States (Kaweesak Chittawatanarat & Bhurayanontachai, 2014).

Other findings have been mixed. In a large study of 75 acute care hospitals in Canada, Tourangeau et al. (2007) determined that the amount of nurse staffing was not associated with 30-day mortality. In another study, Blegen and Vaughn (1998) also examined the relationship between nurse staffing and patient outcomes. Their results demonstrated a nonlinear relationship between the proportion of RNs on a unit and medication errors. The rate of medication errors decreased when the proportion of RNs increased from 50% to 85%; however, the rate of medication errors increased when the proportion of RNs rose above 85%. The authors note that these results suggest that, just as there is a minimum number of nurses that is beneficial for patient outcomes, there may also be a maximum number of nurses (Blegen & Vaughn, 1998).

1.1.2 External Stressors on Critical Care

Factors that are external to the ICU are placing increasing pressure on critical care providers, especially the nurses who are the hub of patient care and communication. Two significant external factors are the changes in patient demographics and the growing shortage of critical care nurses.

1.1.2.1 Changing Patient Demographics

In 2012, the last year for which data are available, there were 46.2 million persons 65 years of age or older in the United States, making up 14.5% of the United States population (Colby & Ortman, 2015). Though projections of the numbers of Americans age 65 and older vary, demographers agree that the proportion of older Americans in this country will grow to be at least 20% of the population by 2050 (Colby & Ortman, 2015).

This aging of the United States population will have a dramatic impact on an already burdened health care system. Current data for chronic disease prevalence among civilian non-

institutionalized adults show that 49.8% (117 million individuals) have at least one of ten selected chronic conditions, including hypertension, coronary heart disease, stroke, diabetes, cancer, arthritis, hepatitis, weak or failing kidneys, current asthma, and COPD (Ward, 2014). These ten chronic conditions were selected from a list of 20 that were identified as targets for intervention by the United States Department of Health and Human Services (Ward, 2014; Gerteis et al., 2014). Moreover, half of those adults in the United States who already have at least one chronic condition are affected by multiple chronic conditions (MCC) (Ward, 2014).

The percentage of US adults with chronic conditions is estimated to increase by 42% by 2023, with commensurate growth among older adults, since as age increases, the prevalence of many chronic diseases increases (Bodenheimer et al., 2009). For example, in 2010, hypertension affected 41% of Medicare beneficiaries younger than age 65, whereas it affected 61% of those 65 and older. Similarly, 31% of Medicare beneficiaries less than age 65 had high cholesterol, yet 48% of their counterparts 65 and older had that condition (Centers for Medicare and Medicaid Services, 2012). MCC also becomes more prevalent as Medicare beneficiaries age. Among those beneficiaries aged 45 to 64 years in 2012, 32% had two or more chronic conditions, compared to 61% of beneficiaries aged 65 and older (Centers for Medicare and Medicaid Services, 2012).

This increased prevalence of MCC will require a more specialized health care workforce, as well as more health care workers (Dall et al., 2013). This need includes critical care facilities and critical care providers, as individuals with underlying chronic diseases and comorbidities are frequently admitted to the intensive care unit. The most common preexisting comorbidities are hypertension, COPD, and diabetes (Perazella, 2012). Though these conditions are often separate from admission diagnoses, they affect decisions about treatment types and intensity as well as impact patient outcomes (Esper & Martin, 2011).

1.1.2.2 Critical Care Workforce Shortage

The number of intensivists in the United States has not increased commensurately with the number of ICU beds. This implies that intensivists will need to care for greater numbers of patients, assuming that the shift toward the closed ICU model, in which the intensivist has responsibility for the care of patients admitted to the ICU, continues (Pronovost et al., 2002; Ward et al., 2013). In addition, recent guidelines have extended the high-intensity staffing model and have encouraged hospitals to staff their ICUs with an intensivist 24 hours a day, seven days a week. Research subsequent to the release of these guidelines revealed that there were not enough intensivists in the United States to comply with this staffing recommendation (Ward & Chong, 2015). In 2014, over 10,300 intensivists were practicing in the United States (Society for Critical Care Medicine, 2016).

One report estimates, however, that there will be a deficit of 1500 intensivists by the year 2020 (Goran & Mullen-Fortino, 2012). Clinicians and researchers have suggested a number of solutions to the supply of intensivists in the United States. Some have advocated for increased opportunities for fellowship training programs for intensivists (Halpern et al., 2013). Others suggest offering expedited training for hospitalists to become intensivists (Siegal et al., 2012).

Deficits also exist in the nursing workforce. In 2014, over 503,000 critical care nurses were practicing in the United States (Society for Critical Care Medicine, 2016). Though the number of graduates from nursing education programs is increasing, it will not bridge the gap of nurses needed to adequately staff ICUs at recommended ratios. In 2008 the last year for which data are available, estimates suggested that nursing graduate numbers would need to increase by 30% in order to keep up with demand (American Association of Critical-Care Nurses, 2004). In addition, nursing demographics are changing along with the rest of the United States population.

In 2014, 55% of the United States nursing workforce was aged 50 years or older, and within the next 10 to 15 years, it is estimated that one million nurses will retire (Budden et al., 2013; National Center For Health Workforce Analysis, 2014). In 2012, about 87,000 nurses graduated from baccalaureate programs; if trends continue, this will not be enough nurses to replace those that retire (American Association of Colleges of Nursing, 2012).

The staffing shortage will likely affect patient mortality and outcomes. One study determined that higher nurse-reported adequacy of nursing staff was associated with lower 30-day mortality rates for acute medical patients (Tourangeau & Cranley, 2006). Other studies found inverse associations between nursing resources and patient infection rates (Hugonnet et al., 2004; Cimiotti et al., 2012).

1.1.2.3 Financial Considerations in Critical Care Medicine

Financial stressors put pressure on critical care service delivery. The cost of patient care in ICUs is rising. Though ICU beds make up 15% of all hospital beds in the United States, they use as much as 34% of hospital resources (Lustbader & Fein, 2000; Halpern & Pastores, 2015). Furthermore, the ICU is a considerable source of spending, comprising \$82 billion, or 0.66% of the gross domestic product (GDP), and it is expected to increase significantly in the future (Fleming, 2011; Halpern & Pastores, 2015). Because these costs are growing, payers pressure providers to provide patient care that is more efficient yet high quality. This topic is the subject of repeated debate and research, and it is a challenge for providers to provide care that meets these guidelines (Anderson et al., 2014).

These financial considerations also impact patient satisfaction. The movement toward patient-centered care has transformed the patient into a customer of health care services, and there is increased emphasis on creating the most positive experience possible for the patient. Indeed,

patient satisfaction scores are extremely influential on hospital marketing and value-based purchasing calculations. These considerations add an additional layer of stress on critical care providers (Schleyer & Curtis, 2013; Kennedy et al., 2014).

1.1.3 Internal Stressors on Critical Care Providers

Intensive Care Units have distinct environments that affect patients and staff. The atmosphere of ICUs has been described as “stressful” and “tragic” (Embriaco et al., 2007; Fridh et al., 2009). ICU nurses have heavy workloads, with complex and urgent tasks. As noted, they must also cope with frequent moral and ethical dilemmas. (Duxbury et al., 1984; Embriaco et al., 2007). These dilemmas may lead to moral distress. Moral distress occurs when an individual knows the ethical course of action to take in a situation, but is not able to take that course (Elpern et al., 2005). ICU nurses often have the difficult task of managing the wishes of the family, the wishes of the patient, the wishes of the physician, and their own ethical beliefs. They most frequently experience moral distress when they must provide aggressive care to patients who are not expected to benefit from that care or must extend a patient’s life against the wishes of the patient. Moral distress in nurses is associated with job dissatisfaction, job retention, and burnout (Elpern et al., 2005).

Studies have investigated the relationship between the organizational characteristics of critical care nursing and patient outcomes; however, most of the research has examined only the staffing aspect of nursing organizations. While lower staffing ratios are associated with decreased patient mortality, other factors also influence patient outcomes. A study by Kelly and colleagues (2014) analyzed the impact of critical care nursing factors on 90-day mortality of 55,159 mechanically ventilated older adults in a sample of acute care hospitals. The team examined the impact of critical care nurse staffing, nurse work environment, nurses’ education, and nurses’

experience. Nurse work environment was measured with the Practice Environment Scale – Nursing Work Index (PES-NWI), a validated instrument with five subscales: Staffing and Resource Adequacy; Nurse Participation in Hospital Affairs; Nursing Foundations for Quality of Care; Collegial Nurse-Physician Relations; and Nurse Manager Ability, Leadership, and Support of Nurses. After adjusting for patient, hospital, and physician characteristics, the team found that patients in hospitals with better nursing environments had lower odds of death than patients in hospitals with less favorable nursing environments (Kelly et al., 2014).

Organizational leadership has a significant impact on the organizational environment of a unit (Gray-Toft & Anderson, 1985; Laschinger & Leiter, 2006). This environment positively or negatively shapes role perceptions and job satisfaction in staff who are lower in the hierarchy. In the hospital environment, when the impact of the environment is negative, role conflict—when an employee is expected to play two incompatible roles in the workplace—and role ambiguity—when an employee’s job profile is not clear—may occur. Job dissatisfaction is another potential outcome, and these lead to nursing stress and absenteeism. Gray-Toft and Anderson (1985) proposed a model for the mechanisms for these outcomes. They posit that organizational climate impacts supervisory style which, in turn, affects workgroup relations, role perceptions, and job satisfaction. Research suggests that when supervisors encourage two-way communication and allow staff to participate in decision making, interpersonal conflict and non-cooperative relationships among staff decrease. Most patient care in the ICU is part of a team effort, and when teams function ineffectively, patient care and outcomes, including mortality rates, suffer (Laschinger & Leiter, 2006). On the other hand, supervisors who clarify expectations and specify staff roles create an environment in which role ambiguity is reduced and job satisfaction increases. Nurses who are satisfied with their jobs and who experience less frequent stress are more likely to

be present at work and less likely to seek employment elsewhere (Duxbury et al., 1984; Gray-Toft & Anderson, 1985).

Nursing turnover also has significant financial impact. When a nurse leaves her position, the organization must then pay advertising and recruitment costs in order to fill the vacant position, in addition to the costs of agency nurses to cover staffing or the costs of closing beds or diverting patients because of insufficient staffing. Once a new nurse is hired, there are training costs and indirectly, lost productivity as the new nurse acclimates to her new job. Other indirect costs include loss of organizational knowledge when the former nurse leaves and a disruption in the unit's organizational climate when the new nurse arrives. The costs of nursing turnover vary, depending on the characteristics of the nurse who left and the organization she left. One estimate puts the cost of turnover at 1.3 times the salary of the departing nurse (Wunsch et al., 2012). With the median annual salary of a critical care nurse at \$98,190, the costs of turnover in a hospital can quickly add up (Bureau of Labor Statistics Division of Occupational Employment Statistics, 2015). One report estimates that every 1% increase in nursing turnover costs an organization \$300,000 annually (PricewaterhouseCoopers, 2007). In an era of chronic understaffing and workforce shortages, these are issues of prime importance.

1.1.4 Burnout Among Critical Care Nurses

Nurses who work in critical care are especially vulnerable to burnout and its effects. The fast pace and challenges of the ICU attract many nurses; however, those qualities that make the ICU exhilarating can also make it stressful. ICU nurses are at greater risk for developing burnout because of the increased chronic stress of their job environment, compared to that of other hospital units (Chlan, 2013). Burnout syndrome among critical care staff has been well documented. For

nurses, the main contributors to burnout syndrome are the organizational culture of the ICU and the moral distress surrounding end-of-life issues (Chlan, 2013; Wagner, 2015). Staffing and workload are also significant sources of stress and predictors of burnout in the ICU, as well as conflicts with colleagues, including physicians, administrators, and other nurses (McCranie et al., 1987; Chlan, 2013). In the Job Demands-Resources Model, moral distress, inadequate staffing, heavy workloads, and conflicts with colleagues fall into the job demands category and lead to exhaustion and poor health outcomes. This model is explained further in section 1.1.4.2.

A number of ICUs in the United States, especially those in smaller community hospitals or in resource poor areas, are not able to follow the evidence-based high intensity intensivist staffing model. These ICUs may not have an on-site intensivist during the day shift, or they may not have one at all, relying instead on hospitalists or community physicians. In the absence of an intensivist being physically present in the ICU, nurses often must attempt to reach a physician on the telephone. The busy schedule of a hospitalist or the sleep schedule of an intensivist who is on call at night often makes this a difficult and time-consuming. It takes the nurse away from her patients, which delays care and adds to her workload. When a nurse is unable to reach a physician for an immediate patient need, she may resort to making a clinical decision on her own, increasing her cognitive burden (Bucknall, 2003). These barriers also increase the potential for negative patient outcomes (Aiken et al., 2002). This characteristic of many ICUs adds to the stress experienced by nurses and contributes to the development of burnout.

A study by Bakker and colleagues (2005) of 1849 ICU nurses in 12 European countries found consensus among study participants that burnout is prevalent in the ICUs in which they were employed. That is, staff who worked in the same units had similar perceptions about the number of their coworkers' complaints about burnout. Furthermore, the perceived level of coworkers'

complaints about burnout predicted burnout at the level of the individual and of the ICU, suggesting that burnout may be contagious and pass from nurse to nurse. Though emotional contagion occurs in other professions, nurses, who typically are tuned into the needs of their patients and families, may be especially vulnerable to the emotions of their coworkers. As in other models of contagion, the higher the number of nurses with burnout, the faster it spreads and the more widespread it becomes (Bakker et al., 2005). These results underscore the importance of fostering a positive organizational culture to limit the effects of determinants of burnout in ICUs.

The high acuity of ICU patients contributes significantly to critical care nurses' emotional exhaustion. ICU patients typically have complex medical issues, and their nurses manage multiple aspects of their care and must make clinical decisions quickly and often, independently (Chlan, 2013). While some burnout research points to the perceptions of workers' relationships with their clients as a factor in the development of burnout, ICU patients are often sedated and unconscious because of their illnesses, making nurses' interactions with them limited and one-sided. This aspect of the ICU gives greater importance to the contagion theory of burnout, since nurses' relationships with their coworkers become more prominent (Bakker et al., 2005).

Another significant contributor to burnout among ICU nurses is the morally distressing situations they experience daily as they care for patients who are very ill and often at the end of life. As described above, moral distress occurs when an individual must act in a way that contradicts what he or she believes is ethical or that goes against his or her personal or professional values (American Association of Critical-Care Nurses, 2004). Though nurses are the hub of the ICU patient's care team, physicians make the final decisions about the patient's care plan. Often, moral distress manifests itself when there is a decision to continue aggressive treatment on a patient, when the nurse believes the treatment to be futile. Such treatment can at times be against

the patient's wishes but is ordered by physicians or requested by the patient's family, and this compounds the nurse's moral distress (Chlan, 2013).

Studies have explored the correlation between moral distress and burnout in critical care nurses; one study by Meltzer and Huckabay (2004) examined the frequency of moral distress situations and the relationship to emotional exhaustion, a component of burnout. For the 60 critical care nurses included in the study, moral distress accounted for 10% of the variance in emotional exhaustion. These results suggest that helping nurses manage their perceptions of morally distressing situations may decrease emotional exhaustion and ultimately, burnout (Meltzer & Huckabay, 2004). Since ICUs are being used increasingly for patients who are terminal but not critically ill, morally distressing situations are likely to become more common, underscoring the importance of addressing this component of burnout before the problem compounds (Ward & Chong, 2015).

Furthermore, ICU nurses provide care not only for patients but also for the families of those patients. Providing emotional support for suffering family members often leads to emotional exhaustion. As noted above, emotional exhaustion is a key factor in burnout and leads to depersonalization of patients, clients, and others in that relationship. When nurses depersonalize their patients and become cynical, they may not take an active role in their care, since they may feel powerless and that their care is not effective for their patients (Bakker et al., 2005; Chlan, 2013).

1.1.4.1 Predictors of Burnout in Nurses

Studies have examined predictors of burnout in individual nurses, since not all nurses who work in stressful environments will develop burnout. Research in the 1980s built on earlier work that suggested that certain resources available to an individual acted as buffers against stressful life

events. Thus, researchers began to investigate the idea of “stress resistance” in hospital-employed nurses. The concept of “hardiness” emerged from this work. Defined as a constellation of the dimensions of commitment, the ability to stay engaged in life events; control, the belief that one can influence life events; and challenge, the conviction that change is inevitable in life and can be a force for good, hardiness allowed individuals to remain mentally healthy after exposure to stress.

One study by McCranie and colleagues (1987) examined the impact of “hardiness” as a moderator on the impact of job-related stress on burnout in hospital-employed nurses. The study team surveyed 260 nurses who worked in 18 units, including intensive care units, in a 700-bed community hospital. Participants’ scores for hardiness, burnout, and perceived job stress were analyzed to determine interactions among the instrument subscales. This work validated earlier work suggesting that individuals who have lower hardiness scores and more frequent job stress have higher reported burnout. However, McCranie and colleagues’ work suggests that while hardiness helps to reduce burnout, its effects work only up to a certain point; that is, high levels of stress lead to high levels of burnout, regardless of whether hardiness is present (McCranie et al., 1987).

A study conducted by Schmitz and colleagues (2000) examined the potential moderating effect of locus of control on stress and burnout among hospital-employed nurses in Germany. Locus of control has been proposed as a factor that, when present, buffers the effects of life stressors. Similar to hardiness, locus of control is the extent to which a person perceives that she can control an event. Some individuals exhibit an external locus of control; that is, they believe that life events are not within their control. These people are more susceptible to the effects of stress, especially those that are health-related. The German study measured work-related stress, burnout, and locus of control in a convenience sample of 361 nurses from nine units in five German

hospitals. Results showed a positive correlation among burnout, perceived work stress, and lack of control, as well as a negative correlation between work stress and control.

These findings illustrate the hypothesis that nurses who believe that they cannot control events in the workplace are more vulnerable to stress and thus, to burnout. Furthermore, nurses who perceive that they have less control are also likely to have fewer coping strategies, leaving them more vulnerable to the effects of persistent and repeated stress in the workplace, setting up a cycle that likely leads to burnout (Schmitz et al., 2000). This aspect of control is especially salient for the ICU setting, where nurses have substantial workloads and responsibilities but limited authority and decision making abilities (Bakker et al., 2005).

1.1.4.2 The Job Demands-Resources Theory

In 2001, Demerouti et al. proposed the Job Demands-Resources (JD-R) Theory, an extension of the Job Demands-Resources (JD-R) Model. The JD-R model arose from the observation that despite every occupation having its own unique stressors and causes of employee well-being, these factors of stressors and causes of well-being can be classified into two categories: job demands and job resources. These categories are antecedents of burnout (Demerouti et al., 2001; Bakker et al., 2014). A depiction of the JD-R model is shown in Figure 1.

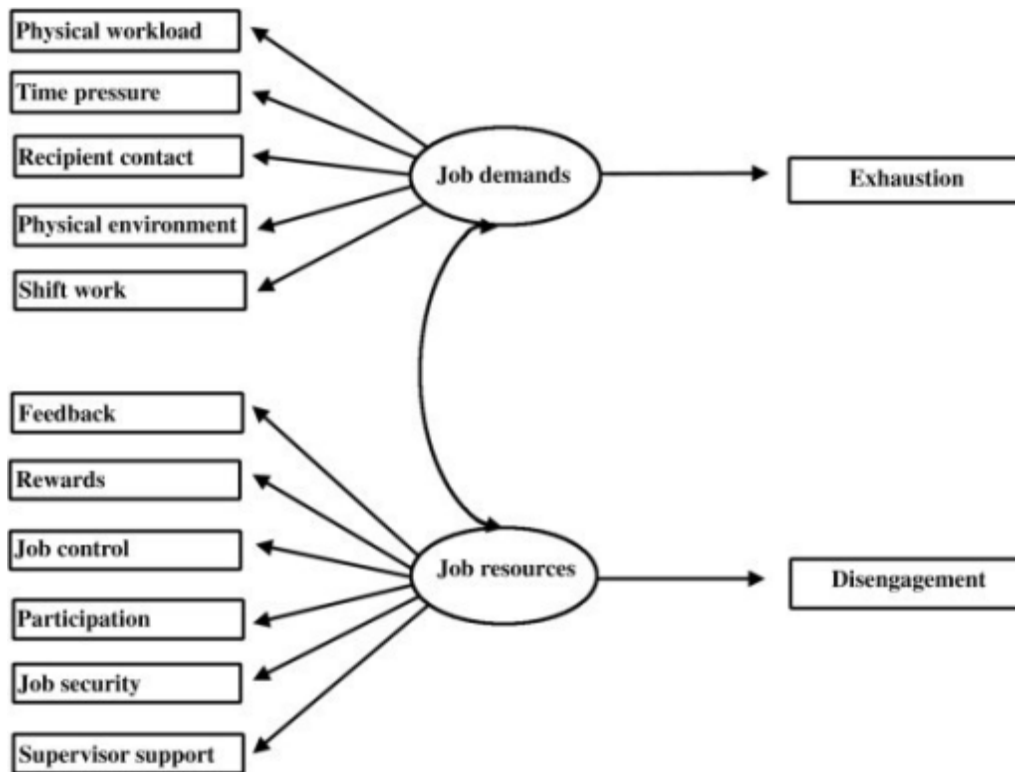


Figure 1. The Job Demands-Resources Model
 From Demerouti et al., 2001

Job demands are “physical, social, or organizational aspects of a job that require sustained physical or mental effort” (Demerouti et al., 2001, p. 501). These occupational aspects are the most significant predictors of exhaustion and health complaints. Chronic demands lead to reduction in a worker’s mental and physical resources, precipitating physical problems, such as cardiovascular issues and poor sleep quality. Examples of job demands include emotional demands, work pressure, and task changes (Bakker et al., 2014).

Job resources are the physical, social, psychological, and organizational factors of a job that help achieve work goals, lead to an employee’s growth and development, and reduce job demands (Demerouti et al., 2001). These aspects tend to predict work engagement, motivation, and work enjoyment (Bakker et al., 2014). Job resources may be internal or external to the employee. The JD-R originally focused on the external resources, since at the time, there was not

agreement about which resources were stable and which could be changed with corresponding modifications to the organizational environment (Demerouti et al., 2001). However, subsequent work pointed to the roles of perceived control and resiliency (Bakker et al., 2014). Other examples of job resources include social support, task variety, participation in decision making, and job control (Demerouti et al., 2001; Bakker et al., 2014). When job resources are low, an employee cannot cope with environmental stressors in the workplace. The employee withdraws or lowers her motivation in order to protect herself (Demerouti et al., 2001).

The JD-R theory proposes that the processes initiated by job demands and job resources interact to predict the development of burnout. When job demands are high, job resources buffer stressors to lessen their impact and negative effects on physical and mental health, such as the exhaustion and depersonalization that are the hallmarks of burnout. When job resources are numerous, employees are better able to cope with daily job demands; the JD-R theory points out the importance of the availability of organizational resources for workers (Bakker et al., 2014).

Findings from studies examining determinants of burnout among nurses lend support to the Job Demands-Resources Theory. In the model, job control falls into the job resources category. When workers perceive that they have more control over the day-to-day activities of their jobs or influence over the outcome of work-related events, they are better able to cope with the job demands that cause stress and exhaustion. This, in turn, acts as a buffer against the development of burnout (Bakker et al., 2014).

1.1.4.3 Interventions for Burnout in Nurses

Burnout interventions can be categorized by their focus: individual/group, organization, or a combination of the two. Since burnout is considered to be the final outcome of repeated stress in work settings, interventions do not target burnout itself but aim to prevent its causes (Felton, 1998).

Of interventions that have been studied, nearly all of them focus on individual coping skills and methods to manage stress, such as training staff in adaptive coping skills or using relaxation techniques during non-work hours (Felton, 1998; Awa et al., 2010). Despite the vast body of research surrounding burnout and the increased amount of attention it receives from hospital leadership, few interventions targeting nurses have been proposed. While these interventions help decrease stress in nurses who participate, the effect is only temporary, as nurses must return to the work environment that lead to their symptoms of stress and development of burnout.

Organization-directed interventions attempt to address and modify determinants of burnout that exist in the work environment, such as increasing staff participation in decision making and task restructuring to reduce workload (Awa et al., 2010). Organization-directed interventions are less commonly proposed and studied; in a 2010 review of 25 interventions, Awa and colleagues categorized 68% of interventions as person-directed, 8% as organization-directed, and 24% of interventions as a combination of organization- and person-directed. The researchers examined the duration of significant positive changes in burnout for each of the types of studies. Burnout effects lasted up to six months for participants in the person-directed interventions and up to one year for participants in three out of four of the organization-directed interventions. The study team also assessed the interventions' effects on burnout risk factors, such as fatigue and emotional job demands, as well as burnout protective factors, such as support from co-workers. Positive effects on risk factors tended not to last over six months for all types of interventions. Effects on protective factors tended to last longer, up to one year for all types of interventions.

These results suggest that interventions targeting burnout should be ongoing in order to address the decrease in positive symptoms that tends to occur after the intervention is over. The results also suggest that organization-directed interventions have longer lasting effects on burnout,

though more research is needed to add to the evidence base (Awa et al., 2010). The Job Demands-Resources theory supports this conclusion, as well. Interventions that strengthen the organizational structure of an ICU, such as providing opportunities for nurses to take part in decision making or implementing a mechanism to increase support for nurses, strengthen job resources available to nurses. When job resources are numerous, they act as a more effective buffer against high job demands, decreasing the likelihood of burnout (Bakker et al., 2014).

As discussed above, the organizational environment of the hospital and the individual unit have the largest effect on the development of burnout in nurses. Yet, to date, few interventions targeting changes in the organizational environment have been proposed. A few studies have suggested a relationship between participation in decision making in the workplace, a proxy measure for locus of control, with job satisfaction. Other interventions delivered social skills training in the workplace. While these interventions improved problem-solving skills and increased participants' perceived control, effects have been limited, likely because burnout is complex, with many factors that contribute to its development (Schmitz et al., 2000).

1.1.5 ICU Telemedicine

ICU telemedicine was implemented as a complement to bedside critical care services. It was not primarily intended as an intervention to affect burnout among critical care nurses; however, since it is a structural change in the organizational environment that modifies staffing patterns and care practices in ICUs, it may have a role in alleviating burnout in nurses (Felton, 1998). For more than 40 years, the practice of telemedicine has used telecommunications technology to remotely diagnose and treat patients in a variety of physical and behavioral health settings. Clinicians in both settings exchange information about patients to improve their health status. Telemedicine

has spread to many parts of the United States and is integrated into a number of hospitals, private practices, and home health settings. It improves access to health care for patients who live in remote areas, and it improves the quality of care by linking patients to specialty providers they may not otherwise see. Telemedicine also makes health care more efficient and cost effective by sharing clinical staff and improving the management of chronic diseases (Rosenfeld et al., 2000; Young et al., 2011).

ICU telemedicine is a mechanism by which critical care services can be delivered remotely, giving ICUs affected by the critical care workforce shortage access to an intensivist when needed (Boots et al., 2011). A critical care team in a separate location, often called the command center or hub, is networked with one or more bedside teams in the ICU, monitors its patients, and provides services as needed. The staffing model in the command center varies according to the organizational factors of the health care system in which it is located but typically consists of critical care nurses who have experience working in the ICU, one or more intensivists, a secretary, and administrative staff. These staff usually work 12-hour shifts that mirror those on the ICUs they monitor; intensivists tend to work only on the night shift, if the ICUs that they monitor have intensivists during the day but not at night. Each work station in the command center consists of a bank of monitors on which staff can monitor vital signs for one or more patients in real time, review medical records and lab results, analyze trends in patient data, and initiate audio and video connection to the bedside in order to visually assess patients and to speak with staff, patients, and families in the room. Figure 2 (below) is a picture of the telemedicine unit from Site 01 in the ConnECCT study.



Figure 2. Telemedicine Unit, Site 01
Source: ConnECCT Study

Because command center staff monitor large numbers of patients in multiple ICUs, their patient management software includes features to help proactively prioritize patient needs, including algorithms to calculate patient acuity, and smart alarms and alerts to draw attention to emergent issues. Communication between the bedside staff in the ICU and the remote command center staff is two-way; either side can contact the other as needed. The command center's services for the bedside vary according to need but typically include placing orders in the absence of a bedside intensivist, providing clinical education and advice, assisting with providing evidence based practices, looking after patients who are a safety risk, overseeing patient codes, documenting bedside care, and collecting patient data for health system metrics or CMS core measures. These services are either provided electronically via integrated electronic health record systems or over the telephone or audiovisual equipment that connects the ICU patient rooms with the tele-ICU.

As described above, ICU telemedicine was conceived as a method to improve access to intensivists, early recognition of patient deterioration, and compliance with evidence based care. Early studies reported decreases in risk-adjusted mortality by as much as 38% after the introduction of ICU telemedicine. Other studies reported a 30% decrease in ICU length of stay from pre-ICU telemedicine metrics (Breslow, 2007). Additional studies suggest that ICU telemedicine is associated with decreased ventilator days, cases of ventilator associated pneumonia, and cardiac arrests, as well as increased compliance with care policies, such as sedation protocols and deep venous thrombosis prophylaxis than units without ICU telemedicine. However, later studies have not always been able to replicate these results. Some researchers have noted that it is difficult to determine exactly how ICU telemedicine contributed to these positive outcomes, since the organizational climate of the study sites was not reported or studied. Furthermore, studies of the impact of ICU telemedicine often have not considered its impact on the environment of the hospital or ICU (Boots et al., 2011). Examining this impact would provide important information about the way in which ICU telemedicine affects the burnout of critical care nurses.

Work overload, such as too little time and not enough resources, contributes to the development of burnout in ICU nurses (Laschinger & Leiter, 2006). According to the Job Demands-Resources theory, workload and time pressure are job demands, and when they are high, burnout is more likely (Bakker et al., 2014). Since ICU telemedicine acts as an additional job resource for bedside nurses in the ICU, it is conceivable that it could alleviate work overload and its associated stressors. For example, as mentioned earlier, an ICU nurse without access to an in-person intensivist may spend a lengthy amount of time trying to contact a physician, taking her away from patient care and adding to her workload. If the nurse works in an ICU that has

telemedicine services, she would have access to a remote intensivist who could both speak with her and examine the patient via the audio and video connection to the bedside. The nurse would receive decision making support, relieving the burden on her and moving patient care forward. Again, according to the Job Demands-Resources Theory, when job resources are numerous, disengagement, a core component of burnout is low (Bakker et al., 2014).

ICU telemedicine also increases the number of critical care trained nurses who monitor and assess patients, in effect lowering the staff ratio for them. Nurses who work in the command center are available to provide support for bedside nurses, such as answer clinical questions, assist with charting or data collection, and provide support in emergent situations. These additional sources of social support could have a significant effect on stress levels and the development of burnout in ICU nurses. In addition, the available support may improve bedside nurses' locus of control. As mentioned above, research suggests that locus of control affects the development of burnout in nurses. Furthermore, the resources of job control and staff support act as buffers against stress and burnout, according to the Job Demands-Resources theory. Nurses who work in ICUs with adequate staffing are less likely to develop exhaustion, one of the core components of burnout. Increased social support also creates an organizational culture of engagement (Bakker et al., 2014).

In health care settings, ineffective communication among staff is inconsistent and inaccurate, occurs too late to be useful, and excludes necessary individuals (Dingley et al., 2008). In the ICU, poor communication contributes to role ambiguity, conflict with coworkers, and distress surrounding end of life care; these issues are associated with the development of burnout in nurses (Poncet et al., 2007; Embriaco et al., 2007; Azoulay et al., 2009). They are also associated with medical errors and poor patient outcomes (Leonard et al., 2004). ICU telemedicine has the potential to improve communication in ICU settings because command center staff have

continuous access to patient trends and information and are typically tasked with relaying that information to the bedside staff. Command center staff are also available to assist with family meetings in which end of life issues are discussed, to coordinate communication among providers within and outside of the ICU, and to oversee and direct patient codes, including assigning roles to the care team and issuing orders. Again, these job resources may act as buffers against the stressors of poor bedside communication and cognitive burden from managing patients in the absence of an intensivist to act as a decision maker. Furthermore, when job resources are numerous, nurses are more likely to stay engaged with their patients, providing the better care that leads to improved patient outcomes (Bakker et al., 2014).

An important aspect to note is that research has not yet fully determined the mechanism by which social support works. Previous studies suggest that perceived support depends on the type of relationship between the provider and the recipient of support, the density of the recipient's social network, and the type of stressor that causes the recipient to need support (Barrera et al., 1981). It may be that social support has a different effect when the person providing the support is in the physical presence of the person who needs support. If social support is more effective in this context, telemedicine may have a negative effect on burnout, since telemedicine by definition is a remote service. More research is needed to further the understanding of this aspect of telemedicine.

1.2 STATEMENT OF PROBLEM

Changing patient demographics and increasing demands to deliver efficient, cost-effective critical care services are placing an undue burden on ICU nurses. Research has demonstrated that burnout among these nurses is a well-established problem. It is likely to intensify unless evidence-based interventions targeting the organizational climate of ICUs are developed. ICU telemedicine is accepted and respected and may be a potential solution to provide support to nurses who are at risk of developing burnout or who already have burnout. More work is needed in order to understand if, and in what ways, ICU telemedicine can support ICU nurses, making them less likely to develop burnout and more likely to deliver effective patient care.

1.3 PURPOSE OF STUDY

Burnout is a significant issue for nurses who work in intensive care unit (ICU) settings. Burnout negatively affects patient outcomes, as well as nurses' wellbeing and intention to remain employed. A major contributor to burnout is the organizational climate of the ICU, yet few evidence-based interventions targeting this climate exist. To explore this gap in the evidence, this study examined perceptions of burnout among critical care nurses and the potential role of ICU telemedicine in addressing burnout in critical care nurses.

The work presented in this paper will examine the ways in which a sample of critical care nurses describe burnout and their perceptions of the role that ICU telemedicine plays in burnout. These results will inform a modification to the model so that it more closely represents the perceptions of the nurses in our sample. This is a first step in better understanding burnout,

informing interventions targeting burnout, and understanding the effects of ICU telemedicine in this population.

ICU telemedicine is an intervention primarily designed to help alleviate resource deficits in ICUs, including meeting evidence based staffing guidelines and providing clinical informational and instrumental support for bedside ICU staff. Inadequate staffing and availability of support are correlated with burnout in nurses. In the framework of the Job Demands-Resources theory, telemedicine has the potential to increase the job resources available to bedside nurses in order to buffer against the chronic job demands they experience. Telemedicine is becoming increasingly common in healthcare settings; understanding its effects on the workforce and potential unintended consequences is imperative to inform implementation of telemedicine programs. This research will add to the understanding of the ways in which telemedicine may impact burnout in critical care nurses.

2.0 METHODS

2.1 PARENT STUDY: CONNECCT

The data for this study are from the NIH-funded Contributors to Effective Critical Care Telemedicine (ConnECCT) (R01HL120980, PI: Kahn). The goal of ConnECCT is to produce a toolkit for facilities wanting to implement an ICU telemedicine program. Aim 1 used Medicare claims data to determine variation in effectiveness among a national sample of ICU telemedicine programs (Kahn et al., 2016). These results informed Aim 2: identifying clinical and organizational factors associated with effective ICU telemedicine use. Data for this analysis were collected as part of Aim 2. The study team used the results of Aim 1 in conjunction with variation in geography, hospital academic status, and ICU bed size to construct a list of possible study ICUs with the telemedicine unit providing services to them. Using the list of ICUs generated from the results of Aim 1 and listed in ascending order of change in mortality, the study team invited sites to participate until five high performing sites, three low performing sites, and one neutral site agreed to participate. The sample also included one ICU that was part of a system also included in study; this ICU was not included in original sample because its telemedicine contract was too new. The final study sample included ten ICUs and six telemedicine units. Table 1, below, summarizes the study sites and their characteristics.

Table 1. ConnECCT Study Sites

Site		Effectiveness	Ownership	Urbanicity	Academic Status
Site 01	Telemedicine Unit				
	ICU	High	Non-Profit	Large Urban	Small Teaching
Site 02	Telemedicine Unit				
	ICU 1	Low	Non-Profit	Large Urban	Large Teaching
	ICU 2	High	Non-Profit	Large Urban	Non-teaching
Site 04	Telemedicine Unit				
	ICU 1	Low	Non-Profit	Rural	Non-teaching
	ICU 2	High	Non-Profit	Rural	Non-teaching
Site 05	Telemedicine Unit				
	ICU 1	Low	Non-Profit	Large Urban	Small Teaching
	ICU 2	High	Non-Profit	Large Urban	Non-teaching
Site 06	Telemedicine Unit				
	ICU 1	N/A	Non-Profit	Large Urban	Non-teaching
	ICU 2	High	Non-Profit	Large Urban	Small Teaching
Site 07	Telemedicine Unit				
	ICU	High	Non-Profit	Large Urban	Non-teaching

Study site visits for data collection took place between February 2015 and January 2016. These visits lasted four days per ICU, with at least three researchers dividing their time between the telemedicine unit and ICU. The study team sent pre-visit surveys to the telemedicine director and the ICU director to obtain data about unit characteristics and to help inform site visits. The team scheduled time for their observations to cover weekdays, weekends, shift changes, routine telemedicine interactions between units, and other times indicated on the survey for greater chances of seeing telemedicine interactions. During the site visits, the researchers recorded observations of daily ICU and telemedicine unit activity and telemedicine unit-ICU interactions; conducted semi-structured interviews and focus groups with physicians, nurses, administrators, respiratory therapists, and other staff who could speak about telemedicine use; and collected artifacts. Artifacts included telemedicine promotional materials, workflows, tele-ICU data collection tools, and patient outcomes data. Individuals who took part in an interview or a focus

group completed a demographic questionnaire. All study procedures were conducted by trained members of the study team.

The study team revised interview and focus group scripts after each site visit, based on their functionality and items of interest. The team also added administrator interview scripts for telemedicine unit and ICU administrators, based on a revised version of the original interview scripts. The original interview script did not include a question about burnout. The team added an exploratory question about burnout after participants volunteered thoughts about burnout and the role of telemedicine in burnout during the first site visit in February 2015. The added question was “How does telemedicine play a role in staff burnout?” The topic of burnout also spontaneously arose during other parts of the interview with some participants. It is important to note that the nurses who participated in ConnECCT were all involved with telemedicine in some way. That is, they either worked in a telemedicine unit, in an ICU that received telemedicine services, or in both a telemedicine unit and an ICU that receives telemedicine services. Because of this study design, we do not have a comparison group of nurses who do not have access to telemedicine services.

For the parent study, interview and focus group audio files were transcribed after each site visit. The transcripts were de-identified and uploaded into NVivo 11, a qualitative software analysis package. Two members of the site visit study team developed the codebook iteratively with an additional trained researcher who did not attend site visits and was blinded to study sites. Next, the data were coded thematically by two members of site visit study team who also participated in codebook development, as well as one trained researcher who did not attend site visits and who did not participate in codebook development. During the codebook development and coding process, the team established intercoder reliability during regular intervals, discussing

discrepancies until consensus was reached. Interview transcripts were linked to organizational and demographic survey data in NVivo 11.

Qualitative methods are used increasingly in critical care settings, since they are well suited to describing and interpreting complex environments. They are better able than quantitative methods to address questions about social interactions, health care delivery models, and organizational issues (Sinuff et al., 2007).

2.2 CURRENT STUDY: BURNOUT AMONG CRITICAL CARE NURSES AND THE ROLE OF ICU TELEMEDICINE

2.2.1 Qualitative Analysis

For this study, one of the coders performed an in-depth analysis of the transcripts of the 118 nurses who took part in a semi-structured interview. The unit of analysis was the interview. These transcripts, particularly the segments of text that were coded with the “Burnout” code during the first pass, were examined for themes that are relevant to this study, such as perceptions of burnout, determinants of burnout, coping mechanisms for burnout, factors that alleviate burnout, and the ways in which telemedicine alleviates or exacerbates burnout. A codebook was developed iteratively and used to code the nurses’ interview transcripts in NVivo 11. Please refer to Appendix A for the codebook.

After the transcripts were coded in NVivo, the data for each code were examined for similarities and common themes. Each code was also inspected for its relationship to the others, and a preliminary model was constructed. This preliminary model was used as the basis for

tailoring the Job Demands-Resources Model to further adapt it to critical care nurses who work in settings involving telemedicine services.

It is important to note that the nurses in the study sample were not assessed for burnout, though some of them reported that they felt burnt out, either currently or in the past, and described their feelings of burnout from that perspective. Other nurses described their experiences of having co-workers they perceived to have burnout.

2.2.2 Quantitative Analysis

2.2.2.1 Interview Data

First, the interview data presented in Chapter 3 were extracted from NVivo and examined for segments coded with the types of support described by respondents (Telemedicine Unit Emotional Support, Telemedicine Unit Instrumental Support, Telemedicine Unit Informational Support, Mentor for New RNs, Telemedicine Unit Place to Work After Burnout, and No Support). Each respondent's study ID was entered into a row on a table, while each type of support was entered into a column on the table. For each type of support, respondents were assigned a number based on whether or not they endorsed that support in their interview data. A zero denoted no endorsement of it, while a one denoted endorsement. For this categorization, the Telemedicine Unit Increase Burnout code was combined into the Telemedicine Unit No Change code to make the No Support code, since if telemedicine increases burnout it is not providing positive support to the nurses. Refer to Appendix A for the entire codebook.

2.2.2.2 Demographic Data

Next was the addition to the table of respondents' data from the participant demographics survey (refer to Appendix C.1 for a copy of the survey). The variables of interest (Years of ICU Experience, Work Location, Work Schedule, and Typical Shift) for each respondent were added as columns and, if necessary, recoded so that the categories for each variable were mutually exclusive. For example, if a participant noted that she worked in the ICU and in another unit in the hospital, she was coded as working only in the ICU. While the responses for "Years of ICU Experience" had three answer choices on the survey, they were collapsed into two categories for this analysis (10 years or less and More than 10 years).

Years of ICU experience was a variable of interest, since older and younger nurses describe burnout differently, and furthermore, younger nurses may not yet have personally experienced burnout. Moreover, data from the interviews with the nurses revealed that ICU telemedicine can support nurses in different ways at either end of their career trajectories.

Another variable of interest was the location in which each nurse primarily works. Nurses may perceive burnout differently depending on their organizational environment. They may also have differing perceptions of the ways in which telemedicine may support or hinder nurses at the bedside.

Work schedule and shift information were included for analysis because these nurses, too, may have various experiences of burnout and perceptions of the telemedicine unit. Nurses who work full time have more exposure to telemedicine, and in the case of bedside nurses, more exposure to the stresses of the ICU. Furthermore, night shift nurses in the ICU tend to use telemedicine more often and therefore, they have more exposure to it. A summary of the demographic data variables of interest appears in Table 2, below.

Table 2. Demographic Data Variables of Interest

Variable	Rationale
Years of ICU Experience	RNs experience burnout differently at either end of career Telemedicine offers different benefits to RNs at either end of career
Work Location (ICU/Telemedicine Unit)	Different organizational environments offer different perspectives
Work Schedule (FT/PT/Casual)	FT RNs have more exposure to telemedicine and more exposure to ICU stressors
Typical Shift (Day/Night/Both)	Night shift RNs have more exposure to telemedicine and have different need for it

2.2.2.3 Unit Characteristics

Finally, data of interest from the Pre-Visit ICU and Pre-Visit Telemedicine Unit Surveys (refer to Appendix C.2 and Appendix C.3, respectively) were imported and assigned to participants, based on their primary work location. Variables of interest from these surveys were Telemedicine Unit Contracts Education and ANCC Magnet Hospital Status. Telemedicine Effectiveness (High or Low) was another variable of interest and was obtained from the results of Aim 1 of the ConnECCT study. Magnet Hospital Status and Telemedicine Effectiveness are applicable only for respondents who work in an ICU, since telemedicine units are not affiliated with a particular hospital but instead typically serve a number of hospitals.

Whether or not an ICU contracts education from the telemedicine unit was a variable of interest because the provision of education can be a form of informational support. Bedside nurses may or may not perceive it as such. In addition, this service, unlike others included in the survey, was not common to all of the ICUs in the sample and did provide some variation.

The American Nurses Credentialing Center (ANCC) operates the Magnet Recognition Program. Magnet hospitals have demonstrated excellence in nursing and are known for their superior ability to attract and to retain nurses. The criteria for Magnet recognition include nurse empowerment, effective leadership, quality, and excellence in professional practice. ICU nurses who work in these environments likely have a differing opinion of supports provided by the telemedicine unit than do nurses who work in units with less desirable environments, such as ICUs in which nurses do not have a say in decisions or have limited opportunities for professional development.

Telemedicine effectiveness was also included as a variable of interest because ICUs with low effectiveness are experiencing different patient outcomes than the ICUs with high effectiveness. This could translate into differing perceptions of the role of telemedicine. A summary of the demographic data variables of interest appears in Table 3, below.

Table 3. Unit Characteristics Variables of Interest

Variable	Rationale
Telemedicine Unit Contracts Education	Education is a form of informational support Provides variation, as this is not a service common to all ICUs
Magnet Hospital Status	Demonstrated excellence in nursing environment
Telemedicine Effectiveness (High/Low)	Different patient outcomes may mean different perceptions of telemedicine

2.2.2.4 Analysis

A Chi-square analysis was run to compare endorsement of an outcome relative to the whole study sample for each comparison. Data analyses were performed using SPSS version 24 (SPSS Inc., Chicago IL).

3.0 RESULTS

3.1 SAMPLE DEMOGRAPHICS

The majority of the 118 nurses who took part in a semi-structured interview were female (83.1%), white (83.1%), and worked full time (54.2%). Their mean age was 45.2 years. This sample was, for the most part, comprised of experienced critical care nurses, with 53.9% having at least ten years' experience working in an ICU. Finally, most of the nurses in the sample were RN- (21.2%) or BSN-prepared (46.6%). For more detailed demographic information, please refer to Table 4.

Table 4. Characteristics of Nurses Who Participated in Interviews

Characteristic (n = # of nurses)	
Age	45.2 ±11.8
Female	98 (83.1)
Race	
White	98 (83.1)
Black	7 (5.9)
Other	11 (9.3)
Typical work schedule	
Full time	103 (54.2)
Part time	11 (5.8)
Day shift	31 (16.3)
Night shift	40 (21.1)
Floating	5 (2.6)
Years of ICU experience	
Less than 3 years	7 (7.8)
3 – 10 years	39 (38.2)
More than 10 years	55 (53.9)
Highest degree	
Associate/RN	25 (21.2)
BSN	55 (46.6)
MSN	17 (14.4)
Other Master's degree	5 (4.2)
DNP	2 (1.7)
Other doctorate	3 (2.5)
Unknown/No response	11 (9.3)

Values are mean ± standard deviation or frequency (percent)

3.2 NURSES' DESCRIPTIONS OF BURNOUT

When the nurses in this sample described burnout, they tended to characterize it in two major ways. One characterization is a feeling of boredom, complacency, and a lack of growth in their careers. These feelings usually develop over a period of years of working at the bedside in the ICU, after the novelty of the setting fades and the nurse has achieved competency in critical care nursing. Using her personal experience, one nurse recounted recognizing that she was burnt out at the bedside after she felt that she had reached the apex of the development of her skills.

When I was a nurse at the bedside, I changed my job after the first five years and decided I wanted to do something different for growth but also because I was getting a little stale and I felt like I had mastered that and that it was time to move on... (Site 05, ICU 2)

This nurse continued to describe how she knew it was time to move on from the bedside and to seek other work that would once again challenge her.

Many times, an ICU nurse will go to one of our sister hospitals who does patient care that we don't do. For instance, in the OR [Operating Room], they may transfer to the OR of one of our other hospitals because they want to do heart surgery or they want to do neurosurgery. We don't do that there, and so for their growth and, you know, burnout they do that, and they have the opportunity to do it in a big system without having to start all the way over with a new employer. (Site 05, ICU 2)

Other nurses provided similar stories about the ways in which leaving the ICU lead them to develop new skills or to refresh skills they had not used in a long time.

It is important to note that nurses who are burnt out and leave the ICU or the bedside do not always leave permanently. For some nurses we spoke with, it was enough to take a respite from the bedside and to return when they felt ready.

I had one burn out in my career, where I walked away and said, 'You know, I can't work ICU anymore.' So I went out and taught. I set up my personal

business. I did some, you know, things that were still directly related to nursing, but all of a sudden one day the bug bit me again and back I went. (Site 04, Telemedicine Unit)

Another nurse who had a respite from the bedside added that taking time away from the ICU causes some nurses to regain their appreciation for that setting and to remember the reasons why they started working there. This shift leads to the nurse's reinvestment in her career and in her patients.

You start getting invested instead of getting that burn out of, "I'm just clocking in again." It's like, "No, I'm here to work. I'm here to help." (Site 04, Telemedicine Unit)

Another major characterization of burnout for the nurses in this sample was a general impression of feeling overwhelmed and pressured. The nurses in our sample noted that burnout has a number of causes but that it culminates in a particular feeling of complacency, as noted above, or in a feeling of stress. Though general models of burnout point to repeated stress as a precursor to burnout, the nurses in our sample described stress as both a precursor and an end result. The descriptions of burnout tended to be general and ranged from "patient overload with just tired of working" (Site 05, ICU 1) to "worried about every single thought" (Site 07, Telemedicine Unit), and "I just get really frustrated" (Site 07, Telemedicine Unit). One nurse noted that newer nurses often have difficulty adjusting to the pressures of the ICU and tend to leave to work elsewhere.

[S]ome of these new nurses are really getting burned out because it's such a high pressure load we put on them out of the gate, with—the paradigm has kind of shifted. The ICU used to be your end goal as a nurse, that you wanted to retire from working in the ICU, and now it's a stepping stone on to other things. (Site 01, ICU)

3.2.1 Nurses' Coping Mechanisms for Burnout

The nurses in this sample also described some of the ways that they coped with burnout. As mentioned above, some nurses decided to move on from the bedside and to seek other work. These types of work included employment in the telemedicine unit or non-nursing jobs.

I've been in nursing for a very, very long time. After a while, you do get burned out, and it just becomes really difficult, even though I love taking care of patients. That's what I miss the most, taking care of that human touch, but after twenty years, I think it's time to move to the next level or another level. So that's why I moved to the [Telemedicine Unit], really; it was just time to move onto something different. (Site 05, Telemedicine Unit)

Black humor is a common, intentional strategy for managing stress, especially stress resulting from working in an environment where illness and injury are common. Some of the nurses we spoke with noted their use of humor to cope with the stresses of the ICU. This humor seems to bring the nurses together and gives them a sense of community and solidarity.

We cry together, we laugh together, we have really sick senses of humor, we don't mean to ever be disrespectful, but you get kind of this black humor thing going on... (Site 02, ICU 2)

A number of nurses noted that they also found comfort in emotional release. One of the most common forms of emotional release for the nurses in our study sample is the expression of frustrations with coworkers. As with the use of humor, talking with coworkers serves to create a bond with them and provides a buffer against the causes of burnout.

Maybe you go in the bathroom and cry. I remember once in ICU, my best friend...and I walked down the hallway, we'd been there sixteen hours and we were burned, big time burned out. We got halfway down the back hallway, put our backs up against the wall, slid down the wall, sat on the floor with a combination of crying and laughing. Now that's support. (Site 02, ICU 2)

3.2.2 Determinants of Burnout

For the nurses in this sample, burnout came from a number of sources, including heavy workload and task issues, lack of social support, physical difficulties, emotional issues, and the environment of the ICU.

3.2.2.1 Workload and Task Issues

Heavy workloads are a major problem in ICUs, and they are a known determinant of burnout among critical care nurses. It is no different for the nurses in this sample. Some nurses we spoke with cited cognitive burden as a cause of burnout. When they described the nature of their jobs, they spoke about making rapid decisions with little informational support while considering the potential impacts of those decisions, seeking intensivists to write timely orders, and managing the needs of multiple patients with complex medical needs. A number of nurses also alluded to the staffing shortage that currently affects ICU staff. One nurse who works in a telemedicine unit vividly remembers her time working in an ICU and how it helps her provide support remotely to overburdened nurses who are still working at the bedside.

I remember being on the floor working, and if somebody could just fill in my documentation for me like take that busy away...like so many times I've been working on the floor in the ICU, and I'm like, "Oh my God, I wonder if I should do this or do that I wonder if I did that pump right..." So I think that's where we take that mental stress off the nurse. (Site 05, Telemedicine Unit)

Other nurses mentioned tasks that take them away from patient care at the bedside as a source of frustration. The nurses we spoke with value hands-on care with their patients and are bothered when extra steps extend the time it takes to complete a task or to get back to a patient. One nurse cited an increased emphasis on charting as a source of burnout.

Charting is the biggest thing that's really making a lot of nurses get burnt out because we're doing more charting. More kind of centration is being towards what's charted versus taking care of the patient. (Site 05, ICU 2)

Similarly, another respondent noted that nurses in the ICU have many competing priorities, and these priorities often take them away from bedside care. Managing the various tasks and responsibilities while worrying about patients' emergent needs adds additional mental burden on to ICU nurses. As a nurse from Site 07 stated,

I know that nurses are being pulled in many directions. And they're being pulled from their patients, and all the responsibilities... (Site 07, ICU)

A common point of participants was their dislike of spending excess time on the telephone, attempting to reach a physician or another needed staff member. Often, the nurses need assistance with an immediate task and cannot afford to take time away from the bedside to be on the telephone. For units without an intensivist, especially during the night shift, the time spent locating needed staff could be significant. Some nurses described it as "playing telephone operator."

I keep coming back to it, but nurses' most frustration is wasting time doing foolishness, and when you take away the foolishness, you're doing the stuff that you want to do, so it lessens burnout. You know, that's why we become nurses, not to sit on the phone. (Site 05, ICU 2)

3.2.2.2 Effect of Social Support

Social support acts as a buffer against the development of burnout by impacting the stress response, minimizing its effects and allowing the individual to cope more effectively (Cohen & Wills, 1985; Rodriguez & Cohen, 1998). In the ICU, effective social support often takes the form of instrumental support, which is tangible support offered by a coworker. The quotes above illustrate this aspect of the critical care environment. One nurse from ICU 2 at Site 05 described "the environment that the nurses have" and her belief that providing support to nurses helps alleviate

their burnout “so that she doesn’t feel like there’s nobody there for her, specifically in the middle of the night.”

Similarly, the nurses in our sample noted the importance of informational support to help alleviate cognitive burden. Nurses also perceived that this type of support can assist nurses who are, in the words of a nurse from the ICU in Site 01, “stuck.” She described the ICU as having “a lot of different integral parts...keeping [it] functioning really well and smoothly.” She perceived informational support to be one of the components that keep the ICU running steadily. Furthermore, other nurses mentioned the connection between a lack of support and intention to leave their jobs. A nurse from ICU 1 in Site 06 noted, “I think just having that ready resource will prevent staff from feeling that they don’t have the support, which can lead to people leaving.”

3.2.2.3 Interactions with Physicians

Not only did the nurses in our sample believe that time spent locating physicians on the telephone led to burnout, they also acknowledged the role of negative interactions with the physicians. This aspect was especially relevant for nurses who worked the night shift or during times when an intensivist was not present on the unit. One nurse who worked in the telemedicine unit at Site 05 related, “I always work nightshift, so it was hard to get our own doctors to call us back because they were sleeping.” Not only is it difficult to wake sleeping physicians, it was also worrisome to risk criticism from an intensivist who was awakened at night. In the words of one nurse who worked in the ICU at Site 07, “I can remember being nightshift and not making calls...because I was afraid to wake a physician up in the middle of the night.” Another nurse expanded this idea when she described being yelled at by intensivists who had been awakened at home.

[I]f I can call [the telemedicine unit] and get the orders instead of having to call the on call physician and keep pissing them off, then yeah. Because they

do get mad being called over and over, and then they yell at you, and then it gets to the point where the nurses don't even want to call the physicians, and then you don't want to not call them just because they're yelling at you. They shouldn't not get the orders they need and it's stressful, and we don't need that extra amount of stress, we have enough stress as it is. (Site 05, ICU 2)

As mentioned, other nurses are hesitant to call physicians when they are sleeping, and they often attempt other ways of getting what they need for their patients, or they avoid calling the physicians if possible. However, as she notes, these tactics do have implications for patient care, such as delaying orders or treatments. It also adds to the stress level of the nurses.

3.2.2.4 Physical Difficulty

Nursing is a physically demanding job, and the nurses in this sample spoke about the toll their jobs take on their bodies. Some nurses mentioned that they have noticed the effect that the obesity epidemic has had on their patient populations, and how it is becoming more difficult to move their patients without assistance from other staff or from a lift. Other nurses noted that they are on their feet for most of their twelve-hour shifts, leading to issues with long-term fatigue. One nurse who currently works in a telemedicine unit mentioned that these physical demands rendered her unable to perform bedside care anymore.

It's hard work, and that's where I'm at now. To go back and take care of four hundred pound patients and pull them out and push a cart to CT scan three times a night and all these sort of things, you can't physically do it anymore. (Site 04, Telemedicine Unit)

3.2.2.5 Emotional Issues

Moral Distress

Moral distress is common in ICU settings. It occurs when an individual knows the ethical course of action to take in a situation but is not able to take that course (Elpern et al., 2005). ICU nurses

often have the difficult task of managing the wishes of the family, the wishes of the patient, the wishes of the physician, and their own ethical beliefs. They most frequently experience moral distress when they must provide aggressive care to patients who are not expected to benefit from that care, or when they must extend a patient's life against the wishes of the patient. The nurses in our sample are familiar with moral distress and often included it when they described the development of burnout in themselves and their coworkers.

[W]e go through—really horrible moral conflict situations. You know, a patient who's ninety-two, and they decide to tube and the family's not going to let her go—that's very difficult. (Site 01, ICU)

I can give you an example of something that happened recently with a patient, uh terminal lung cancer, who unfortunately spent three days. Three days? Or twp days down in the emergency room. He decompensated. He was not supposed to be intubated, but the wife ended up allowing him to be intubated, and I mean she, she was just livid. (Site 05, Telemedicine Unit)

The nurses in our sample frequently spoke about the long term effects of moral distress. They often feel they are caught in the middle of conflicting discussions about patients' end-of-life or are providing care that they know a patient would not want. Some respondents mentioned that they could no longer cope with morally distressing situations and felt that they needed to leave the bedside.

Compassion Fatigue

Similarly, compassion fatigue is closely correlated with burnout among nurses. Compassion fatigue is a state of mental exhaustion that develops from being surrounded by the emotional problems of other people. The ICU, because of its patient population, often has an atmosphere of stress and sadness, and so it is not surprising that compassion fatigue is prevalent among nurses. In ICUs, nurses are the constants at the patients' bedsides. One nurse acknowledged that constant

presence and care lead to an intimacy with patients and their families. This connection benefits bedside care; however, it contributes to nurses' heavy emotions during the patients' length of stay and beyond. When nurses are continually taking care of such patients and families, the heavy emotions are always present.

I've also had nurses where they do get the compassion fatigue, and it is stressful taking care of critically-ill patients, especially that intimacy you can get with the patient's family and things like that, where they just felt like they needed, they needed to step away from the bedside a little bit, but they didn't ever want to leave the bedside. You know...that's their passion. That's what they want to be doing, but it was getting to be a little too much. They've had several shifts where it would seem like every time they come in, they would be put on a patient in comfort care... (Site 06, ICU 2)

A number of nurses in our sample described the ICU as generally having an environment of sadness and stress. The ICUs that took part in the parent study had patients of varying acuities, yet the study researchers heard these descriptions almost universally. Participants expressed empathy for the bedside nurses who were immersed in that atmosphere.

[T]he bedside staff is...dealing the compassion fatigue, they're dealing with the stress of the environment, the sadness of the environment, they're dealing with that stuff... (Site 05, Telemedicine Unit)

Other nurses spoke about the effects of the somber ICU environment. These discussions often included the effects of caring for patients and families who had a number of medical and emotional needs. As one nurse related, bedside providers often give so much to others during the course of every shift that they deplete their own reserves.

Every time I went to work I talked to my patients, I gave everything. You give of yourself so much so that when you go home, you've got you have nothing left honestly. (Site 05, Telemedicine Unit)

Depersonalization is one of the core components of burnout. Some of the nurses in our sample noted that, in time, they attempted to use it as a coping mechanism when they felt compassion fatigue overwhelming them. They had varying degrees of success with it, often, as

one nurse noted, because they found it difficult to separate themselves emotionally from their patients.

There also a mental aspect, oh my goodness. I mean, you try to put the barrier there and to...separate feeling...if you're human, feelings are going to get involved, and you can't put a barrier up, I don't think. (Site 05, Telemedicine Unit)

Here, too, the importance of social support was recognized. The ICU nurses we spoke with placed high value on the availability of coworkers for emotional support. They use this support to debrief or to get comfort and reassurance after an adverse event, such as a patient code. They also use their supportive coworkers to express their frustrations with workload and task issues and with other stresses in the ICU.

[We've] all worked with each other a very long time...when somebody's really troubled...they come over and they sit in my chair and they sit down and they talk, and they vent. And I still think you need that trust, that respect, knowing that person understands what you're going through on a day-to-day basis. I see, every day, staff burnout. I have staff burnout. I, every day, experience some level of "Oh my Gosh, can this go on any longer," you know? You're here ten hours, and then you think it's just about time to walk out the door, and a patient family walks in, and they need help...But I feel that we—you still need to talk to somebody that's experiencing the same thing you're experiencing. That sees you day to day, that you can go sit down and trust that person to listen to you and understand, because they see it every day. (Site 02, ICU 2)

One nurse that we spoke with found help with an intervention that used to take place in her ICU.

[W]e used to have what's called moral distress meetings...But that was helpful because that would be something that [the chaplain] would come to, and we actually have people from the palliative care team come and be like, "OK, let's talk about the people who have passed. We know who they are. What do you think is happening?" And we would just talk about stuff. (Site 01, ICU)

Another nurse spoke about the kinds of emotional support that she found helpful in avoiding compassion fatigue. She noted that positive feedback and physical comfort from her coworkers are the most beneficial for her. Other respondents echoed this sentiment.

Maybe they could say to a nurse, you did a great job, you know, I'm sorry this happened, and okay, you didn't do anything wrong, and that might make her—but when she walks out of that room, if something went wrong and the patient died, her support, if she was really involved with that patient for a long time, is going to come from her coworkers, the people that are there, that are going to touch her, hold her hand, see her tears, or cry with her. (Site 02, ICU 2)

3.2.2.6 Nurses' Descriptions of their Personalities

The respondents in our sample identified strongly with their chosen career of ICU nurse. They freely offered descriptions of personality characteristics that they perceived to be at the core of every ICU nurse. Strength of will was a trait that was mentioned consistently in interviews. The nurses in our sample believed that critical care nursing is a field in which strength leads to success. It is also a field in which trust among coworkers is earned and not assumed, possibly because nurses who are strong-willed have learned not to lightly rely on others.

Most every ICU nurse I've ever met tends to be a very strong-willed person, pretty strong personality, good, bad or indifferent, but it is sort of what it is, and trust is earned. (Site 02, ICU 2)

Other respondents described successful ICU nurses as those who are careful and precise. These qualities aid nurses in balancing their heavy workloads and prioritizing tasks that appear to be equally important. Nurses who have longer tenure in the ICU understand that tipping the balance of tasks could mean causing a mistake or adverse event to affect a patient.

...most ICU nurses are very methodical. You know. You do this, then you do this, then you do this, then you do that, and I have to make sure that I've done all my things so that my patient is taken care of, so nothing goes wrong, 'cause your idea is to prevent anything from going further wrong. (Site 05, ICU 1)

Control is another personality trait that respondents felt was key to the success of an ICU nurse. A number of nurses perceived that the more they were in control of tasks and information, the more they could control the outcomes of their patients. One nurse who worked in the

telemedicine unit at Site 05 described herself as a “territorial type A personality disordered control addict ICU nurse.”

Personality traits that contribute to the success of ICU nurses also have the potential to lead to the development of burnout. For example, nurses who are strong willed and do not easily trust others may be less likely to ask for assistance with heavy workloads, or to accept help when it is offered. Acceptance is key to the success of social support. Furthermore, events and issues that alter a nurse’s care, precision, and control are likely to create more stress and add to mental burden, eventually contributing to the development of burnout.

3.3 A MODEL OF HOW TELEMEDICINE AFFECTS BURNOUT AMONG CRITICAL CARE NURSES

3.3.1 Nurses’ Perceptions of How Telemedicine Decreases Burnout

3.3.1.1 Emotional Support

Emotional issues for critical care staff are a natural consequence of the fast-paced, charged environment of the ICU and the nature of the care for very ill patients that occurs in it. Moral distress and compassion fatigue are emotional issues that are common in ICU settings and that are also correlated with burnout (Elpern et al., 2005). As noted earlier, the nurses in this study sample are familiar with these types of emotional issues and cite them as determinants of burnout in themselves and their colleagues.

Nurses who experience emotional issues in the ICU describe several ways of coping with them. One of these ways is through emotional release, such as discussing their frustrations with

coworkers. When asked if the telemedicine unit had ever been involved in addressing their emotional issues, a number of nurses in our sample noted that they liked to talk with the nurses that worked there. In the words of a nurse from Site 01:

[T]here's definitely times when I will call nurses over there that, like, I know and have worked with and just vent to them about, like, stress or, like, bad situations that happen and they just listen and talk with you. (Site 01, ICU)

Nurses who work in the telemedicine unit have similar perceptions.

I think that you're there because you're giving them a pat on the back sometimes for something very difficult that they've done. I've seen them the day that this particular gentleman that was in cardiac arrest and they revived him, I called them up and told them what a great job they did. They were exhausted and they were like, "Well, thank you." 'Cause I'm sure that they don't feel like that at the time. You're just so emotionally drained and you're trying to save this person and you're thinking, "Oh, what did I do wrong?" (Site 01, Telemedicine Unit)

Other nurses who work in the telemedicine unit remember what it is like to work at the bedside and feeling stress in that environment. They often use their memories of that when interacting and communicating with the nurses in the ICU via telemedicine.

You know I still remember to this day, these, these folks are under a lot of stress. There's a lot more put on them now. So, I, the way that I deal with it is that I empathize. (Site 05, Telemedicine Unit)

A number of nurses who work in the ICU noted that the quality of their relationships with the nurses in the telemedicine unit affected their comfort in expressing dissatisfaction or emotional difficulties to them. If they felt that the nurses in the telemedicine unit were a part of the team and that they knew and could trust them, they were more likely to be open with them.

I think they make our life easier...I think they're supportive, and I also think they're nice guys that, you know, you feel like they're part of a team, and so anything that sort of lifts a little responsibility off you and just help you do your job better...I mean when you have someone you're working with and everything goes well and you work hard and there's a good outcome or at least you do interesting things yeah it makes it more exciting again. (Site 06, ICU 2)

Nurses who took part in interviews in this study perceive that a component of burnout is a feeling of complacency and stagnation with nursing. The kind of emotional support that this nurse describes helps her to feel connected to and interested in her nursing practice again.

3.3.1.2 Instrumental Support

Heavy workloads are a fundamental component of critical care nursing. Nurses must independently balance the emergent and pressing medical needs of their patients. Numerous tasks, including rapid decision making, continuous monitoring, and frequent charting, make up this balancing act. The nature of this workload is a source of constant stress for many nurses and is a factor in the development of burnout. A number of the nurses in our sample believe that ICU telemedicine is an important source of instrumental support, which is often defined as tangible support provided by others. According to the bedside nurses in our study, the telemedicine units help to alleviate the nurses' burdens by taking away some of the tasks that do not necessarily need to be completed at the bedside, such as contacting organ donation organizations and entering electronic orders into the system. Many of the nurses we spoke with and who endorsed this type of support believe that this assistance allows them to spend more time at the bedside with their patients and leads to the provision of better care. A number of nurses mentioned that staff in the telemedicine unit help to watch patients that are fall risks. One nurse suggested that this support might help prevent burnout in bedside staff.

But when I think about a patient who would fall out of bed, if the nurse is not in the room. It's a possibility. 'Cause if you have to run into a room every second because a patient is gonna fall, that could kill your whole night. But if you have a camera on the patient, and when the patient attempts to get up, they reorient the patient and all that – the patient lays back down, then that would help to prevent burnout... (Site 02, ICU 1)

I think again since it's such a great tool that it's an asset to have, and it would decrease staff burnout just because of taking all those tasky things away from us and giving us more time to be with our patients. (Site 06, ICU 1)

Staff in the telemedicine unit have access to patients' charts, lab results, and vital signs, and other nurses noted that this access is a key component of providing assistance to the bedside. With this access, telemedicine providers have the ability to monitor long-term trends or short-term, rapid changes in patients' statuses and alert the bedside.

And I can't tell you how often I call them and say, "Can you just do me a favor. I've ordered—I've put in orders for X, Y, and Z. Can you follow up?" You know, they can't see the patient. "But can you follow up on their chart and then let me know what you find?" Because, you know, you get busy or whatever. And that's huge. And that is definitely hugely supportive of your psyche. (Site 01, ICU)

[Telemedicine has] allowed us to become more really autonomous as nurses, and I think it's allowed us to...give better patient care because...declining patient status doesn't have to wait upon the needs of a physician to give orders. You just go. You just do it, and...you can press that...button, and they're there to help you right away...those orders that you need, and I think it's best for the patients, best for the nurses. (Site 04, ICU 1)

Nurses who work in the telemedicine unit also believe that they help to relieve stress on the bedside nurses. They do acknowledge that they cannot take away all of the stress that bedside nurses experience, but they can relieve mental stress.

If we take the busy work away...Calling another nurse would be fantastic. "Oh my God, I need to bounce something off of you, this is what happened." So I think that's where we take that mental stress off the nurse. We may not be there physically but we can take a lot of the mental away, and that in itself is huge. (Site 05, Telemedicine Unit)

Another nurse who works in the telemedicine unit noted that telemedicine can be especially helpful at night, when some ICUs do not have an intensivist available. Nurses who work the night shift often have the additional burden of attempting to locate a physician to obtain orders or clinical advice.

Well, I don't know any statistics, but I'm sure it helps reduce staff burnout. I would imagine less stress if you know that you have somebody else to, you know, to help you when you need help, and you don't have, especially at night when you call the doctor and they don't respond right away and your patient needs help now. You know, and you can call the [telemedicine unit] and have somebody respond and give you what you need. It helps. I'm sure it helps a lot. (Site 05, Telemedicine Unit)

3.3.1.3 Informational Support

Similarly, informational support provided by staff in the telemedicine unit can help alleviate stress on the bedside nurses. Informational support is the provision of advice, guidance, or information that is useful to someone. As mentioned previously, bedside nurses in the ICU often need to make rapid decisions about the care of their patients. Because other ICU staff are also busy, there may not be any one else available to provide clinical advice or feedback. Since staff in the telemedicine unit are available via the press of a button located in the patient's room, a nurse does not have to leave her patient's side to obtain assistance if she has a question or needs a second opinion. The nurses with whom we spoke value this aspect of telemedicine and credit it with relieving stress and, in turn, burnout.

I think they help relieve some of it just by being there as, like I said, a backup for you. If we have any questions or anything, that helps. (Site 04, ICU 2)

As with instrumental support, bedside nurses credit informational support given by the telemedicine unit staff with contributing to the provision of better care at the bedside.

They just have a lot of different integral parts of, like, keeping this functioning really well and smoothly, and, you know, things get missed less, and we've had a decrease in infections, we've had decreased hospital stay length, we've had decrease in our problems with wounds and Medicare, Medicaid. There's all these benefits that have been shown, on top of the fact that, like I said, they've helped how many nurses when they're stuck, they need orders right away, they need some advice, they're right there. (Site 01, ICU)

3.3.1.4 Support for New Nurses

When they discussed informational support provided by the telemedicine unit, the nurses we spoke with frequently mentioned that it is especially valuable for novice nurses. Generally, nurses who were older and had longer careers had a greater tendency to recognize and to endorse this aspect of telemedicine. Critical care nursing is a difficult profession, and nurses who are new to it have much to learn. However, there are not always more experienced nurses located in the ICU available to assist them. The telemedicine units in our study typically required a high level of experience of the nurses that they hire. Respondents recognized that these nurses are “seasoned” and identified the ways that they are able to support new nurses, especially in units that have high rates of turnover.

And we can really get a lot of benefit from these nurses that have been critical care nurses for a very long time, and can just share with you their experiences, which is really beneficial because—I mean, just by any ICU, the turnover’s pretty high, because it’s a really high-stress job, you know, there’s not a lot of us that have been here over five years, but, you know—turnaround time is, I think, like two to four years. There’s always a lot of turnover. So always having that person that has that extra experience, for a lot of the newer people, it’s really nice having that. (Site 01, ICU)

This support can be especially valuable during the night shift because new nurses often work then. The telemedicine unit can be a resource in the absence of an intensivist but also during the times when other experienced staff are not likely to be available.

[T]hat’s an area that I think would be good in terms of... getting new nurses off to a good start ‘cause they all end up on the nightshift, and they don’t have as much support there as they would on the dayshift, so...I think it would be good to have the [telemedicine unit] nurses really be much more involved in their care. (Site 06, Telemedicine Unit)

A few participating study sites recognized the benefit of using the telemedicine staff to assist with the training of new nurses and formalized the mentoring relationship. Study Site 01 described the trial of its mentoring program and the effects that it had on one new nurse.

[W]e had one nurse who—she was struggling...She tends to overthink things and was struggling with time management, some of those issues, and we really tried to hook her up with somebody in the [telemedicine unit] who was a mentor, and that worked really well for that nurse. It worked out really well that she had that one or two familiar faces to call and...say, “Hey, Nurse A, I just need to know, did I do the right thing here? I just need your support on this, or to make sure.” And I think that that helped her. (Site 01, ICU)

A respondent in the telemedicine unit at Site 02 also described its mentoring program for new nurses. This person attributes the program with increasing staff satisfaction and reducing attrition among bedside nurses.

It really, really has been a very huge success for us, with that. Because there always was that, you recognize a little bit of a gap from that time of post-orientation to basic competency in the critical care, and a little bit of a—for the new nurse it’s twofold: one, they know that they have somebody that they can reach out to, that they’ll be speaking to, the bedside really has embraced it, especially the charge nurses, because they know if that new nurse has any questions, or if something happens and the unit’s very busy, whatnot, they have a resource, and they know they’re going to be talking to us. So they feel comfortable with that. (Site 02, Telemedicine Unit)

Some nurses may have experience in the ICU but perhaps are new to the charge nurse position. Interview respondents noted that support provided by the telemedicine unit might also be helpful in these situations because the inexperienced charge nurse has access to nurses who had long tenures in the ICU before moving to work in the telemedicine unit. Furthermore, the telemedicine unit can assist charge nurses in other ways, such as with training and orienting new nurses or with rapid response calls.

I do know that they are very, very helpful with my emotional support. And I think that they are with any charge nurse’s emotional support. Particularly with things like the stat calls, because you make judgment calls and you leave those patients on the floor sometimes. (Site 01, ICU)

3.3.1.5 Respite from Burnout

As mentioned above, the ICU is an environment that is ripe for burnout among the nurses who work there. Nurses who took part in interviews in this study noted that one of the ways that they cope with burnout is to stop working in the ICU and seek employment elsewhere, either temporarily or permanently. One of the places where the nurses in our study seek respite is the telemedicine unit. Across sites, the study team consistently heard that the telemedicine unit is a place for critical care nurses to work when they are unable to continue working at the bedside but still want to contribute to patient care. In the words of one nurse who works in the telemedicine unit at study Site 04, “If you love what you do, even if you get burned out, you still have a tendency to go back and do something. You just do it in a different capacity.”

Critical care nursing is hard on the body. Back injuries are common among nurses. Exposure to repetitive stresses and strains and constant standing and walking also take their toll over the years. Many nurses in our sample spoke about the exhaustion and fatigue that are omnipresent in their lives, and that they perceive it to be a component in the development of burnout in themselves and their colleagues. Other nurses mentioned injuries, notably back injuries, that caused them to cut short their time at the bedside. When bedside care is no longer physically possible, some critical care nurses choose to work in the telemedicine unit as a way to extend their careers. Both users and providers of telemedicine services understand that these nurses have many years of critical care experience and are still a valuable resource at the bedside.

One is I think that what we find with some of our nurses, and it's part of the reason not all of our nurses continue to work at the bedside, is it's a very physically taxing thing to do. So we find that nurses get physically unable to work at the bedside and yet have this intellectual capital that, over years and years, is so valuable, particularly in mentoring new nurses. So I think that for them to have the desire to continue to provide critical care but the inability, potentially, to do the physical care, having a site like this is very helpful because it allows them to extend their careers. And that's not to say, by any

means, that we hire people that say, “I’m just coming here to retire,” because that’s not what our environment is. We’re in a very dynamic – and you really have to be current with the clinical practices. But I do think that we get a certain number of nurses, which is why we tend to have a more mature population, but the benefit to us on that is that our average years of ICU experience in the [Telemedicine Unit] is seventeen years for nurses. So that’s extremely beneficial when you see different kinds of patients. (Site 02, Telemedicine Unit)

When discussing their decisions to work in the telemedicine unit, some of the nurses in our sample noted that the environment seemed interesting and challenging to them. This impression was often a factor that made the environment of the telemedicine unit seem more attractive to the nurses. One nurse who moved to working in the telemedicine unit in her health system described her decision.

And at first, I was just looking for something to supplement, and I liked the idea of doing critical care but in a different aspect, and another thing, to kind of help less burn off... Plus, I knew people who had worked here or were working here, so it seemed like kind of a fun little fit... Something completely different that I’ve never done, so I liked it. (Site 04, Telemedicine Unit)

Another nurse who worked in the telemedicine unit at Site 06 stated simply, “I love doing the changes, that’s my personal [*sic*], I love doing different things... you know you get so excited like, ‘Oh, I want to do this. Oh, I want to do that...’”

Other nurses had mixed feelings about working in a different environment. Some respondents, such as one nurse from Site 05, worried that they might not be able to adjust to sitting after being used to being physically active during a shift.

I had a lot of back pain. I know they had just started the [telemedicine unit], and a couple of my coworkers actually started working right when they first opened, and uh they were like, “Oh [name] you should come over here and work you know, give your back a rest, and you know it’s a really cool environment and very high tech,” and I said “I don’t think I could sit there for twelve hours.” I just don’t think it’s in me. I’m very hyper. I have to move around. So I kind of put that in the back, and I’d say probably about two years went by, and my back pain just got worse, and I decided you know what, it’s

time to make a change...then I thought it was really cool. I wanted to do something different. (Site 05, Telemedicine Unit)

Respondents often mentioned that they missed the close interaction with patients once they began providing care remotely in the telemedicine unit. Some of those respondents were able to continue working in the ICU on a part time basis in order to maintain that connection with the bedside. Other nurses took a brief respite in the telemedicine unit, then went back to work at the bedside full time. As one respondent described, taking time away from the environment of the ICU helps some nurses to remember why they chose careers in critical care nursing and may help them become re-engaged after experiencing burnout.

Yeah, it's hard to walk away from... and that's what most people will say is most of us still like to work the bedside, even though you do get burned out, and then when you're working it less, you start to appreciate it even more, what you loved. You start getting invested instead of getting that burnout of, "I'm just clocking in again." It's like, "No, I'm here to work. I'm here to help." (Site 04, Telemedicine Unit)

Nurses who moved to the telemedicine unit noted that they experienced additional benefits besides alleviation of burnout. Since telemedicine units generally monitor greater numbers of beds than those in a typical ICU, providers are exposed to patient conditions that they might not otherwise experience. Furthermore, telemedicine units cover a variety of specialty ICUs, such as surgical ICUs and cardiovascular ICUs, giving telemedicine staff additional opportunities to participate in the care diverse patients. Nurses value this opportunity to learn more about patient care and to broaden their experiences.

In addition, some interview respondents noted that the unique environment of the telemedicine unit gave them the ability to form closer working relationships with the physicians and other nurses who work there. Because the pace is slower and staff are seated at stations close to one another, they consult with one another and share knowledge.

One nurse from study Site 06 summarized her perception of the professional growth that some nurses experience after they move to the telemedicine unit.

I think...for people who have been at the bedside a long time that maybe want a little bit of change but don't want to leave the bedside this has been an option to allow them to expand their own consultative skills, professional skills, communication skills, as well as give them exposure to other ICUs via the telemedicine. So I know over the years a lot of the staff from the ICUs some that have retired, some that are currently still working, have found that as a way just to grow professionally besides just being at the bedside. (Site 06, ICU 1)

3.3.2 Nurses' Perceptions of How Telemedicine Has No Effect on Burnout

Though many nurses who participated in study interviews discussed the ways in which ICU telemedicine can decrease burnout, a number of respondents simply told the study team that they did not know what effect telemedicine could have on burnout.

Of the nurses who held this belief, a number discussed the provision of emotional support via telemedicine. Most of these respondents felt that emotional support offered in person was more effective than that provided over a camera or telephone. Some nurses worked in ICUs that already had support services for ICU staff provided by a chaplain or social worker. One respondent described what was available in the ICU where she worked and noted the difference between “venting” and needing support for the ethical dilemmas that are common for nurses. She felt that a person who had been trained to assist with these dilemmas would be more effective than a person who had not been trained.

Nurses are nurses. They're great to vent to. However, if you're really having an ethical dilemma, [we have a] chaplain who is readily available, who makes himself—like he makes himself readily available, and I know who he is, he's super cool... Now, I don't think every hospital has that... So if you're appropriately trained and appropriate person to do that, yes. I don't think

everyone—and that’s just me as a nurse, I couldn’t do that. That’s not me...It’s different with my colleagues. (Site 01, ICU)

Other nurses preferred to share concerns with and receive reassurance from their colleagues in the ICU. They noted that they felt more comfortable with other nurses whom they knew and trusted than with people with whom they did not often interact. One respondent stated that she did not think that emotional support delivered via telemedicine would even be well received.

I don’t think it would be well-received. I think nursing—we so support one another, we even support our doctors. When something goes wrong, we kind of band together, and support one another, and I—like I said before, I don’t think we know [the staff in the telemedicine unit] well enough to ever get any kind of support—how do you get support when—see, I feel a big part of support is touch, and it’s contact, it’s maybe seeing tears, or feeling somebody’s pain. You can’t do that through a screen. I’m sorry, I just can’t even—no. Maybe they could say to a nurse, you did a great job, you know, I’m sorry this happened, and okay, you didn’t do anything wrong, and that might make her—but when she walks out of that room, if something went wrong and the patient died, her support, if she was really involved with that patient for a long time, is going to come from her coworkers, the people that are there, that are going to touch her, hold her hand, see her tears, or cry with her. You know. That kind of thing. I don’t see that happening through a screen. No. (Site 02, ICU 2)

When discussions during interviews turned to the potential ways that ICU telemedicine could provide instrumental support for the bedside nurses, some respondents stated that they did not believe that the staff in the telemedicine unit could provide enough assistance to affect burnout. Some respondents believed that telemedicine services were too remote to be effective. One reason is the importance of nonverbal communication, which is not always conveyed via telemedicine. In the words of one respondent:

You know, there’s so much more to...social interaction, and...conversation and understanding of people...just by expressions and gestures and...a lot of nonverbal communication. (Site 07, ICU)

Another reason why respondents did not feel that telemedicine could not meaningfully affect burnout was that the staff in the telemedicine unit could not assist with tasks that they felt

caused them the most stress and pressure, such as charting or being physically present with patients.

I guess I don't really feel like they're involved. I guess I'm not sure how, 'cause usually burnout's just...I'm not sure how they would really be able to assist in that. I mean, they help with orders and things like that by all means in patient care, but they can't physically step in the room and be like, all right you need a break, and let you go. That's not really something they're capable of, so. I don't, I guess, to me, I don't know if they really help with burnout at all. I mean, they can help make the process smoother, which decreases frustration of burnout, but it's not like they can walk in and be like, all right, you're having a shitty night, just go [Laughs] and take five minutes, I'll watch the crazy guy that won't stay in bed. (Site 04, ICU 1)

Other respondents alluded to the relationship between their infrequent use of telemedicine and its lack of effect on their workloads. One nurse from ICU 1 at Site 05 recognized that she did not interact with the staff at the telemedicine unit enough to know them, noting, “[T]his is a team, and you only know how good your team is until you interact with them.” Another nurse from a different site mentioned that the ICU where she works is not consistently busy, and thus she does not need assistance from the ICU on a regular basis.

I mean, it may make their workload a little harder where you have to call, but...On most nights, we don't have to call the doctor. It's only those temporary nights when there's like a really sick patient, which is probably like once every two weeks there's probably a night where it's just horrible. (Site 04, ICU 2)

3.3.3 Nurses' Perceptions of How Telemedicine Increases Burnout

Finally, a small subset of nurses believed that ICU telemedicine can exacerbate symptoms of burnout. Generally, these respondents noted that the telemedicine could increase the workload of the bedside staff. Some respondents cited times when a staff member in the telemedicine unit placed an order without telling the nurse in the ICU.

[T]here was sometimes if they put orders without calling, necessarily, the nurse, my attending nurses find the order, they kind of upset the nurses. Sometimes you see orders that were placed at eight in the morning...but that was not communicated to the nurse, so if the nurse doesn't refresh the screen, it's not gonna see the new orders. So they may see the new order at eleven, twelve, when that happened I had never, nobody called me for this. So it may...get somebody upset. (Site 05, ICU 2)

Other respondents mentioned times when their work at the bedside was interrupted by phone calls from the telemedicine unit. When the bedside staff perceive these calls as unnecessary, they also perceive them as adding to their workload.

I know that nurses are being pulled in many directions. And they're being pulled from their patients, and all the responsibilities, and I, I do think that there's a part of this where, even, like, one more extra call from the [telemedicine unit] might be count— you know, like, oh gosh, it's one more call that I have to contend with, one more thing I have to deal with. So, the, the slight possible possibility with that...I think for the experienced nurses, that feel like they're managing their patients well, and, and you know they're just very busy with all these tasks, and this charting that they have to do, that they feel like it's maybe one more task that they have to deal with. (Site 07, ICU 1)

The last way that respondents thought that telemedicine could potentially exacerbate burnout is the communication between the staff in the telemedicine unit and the staff at the bedside. Interview participants frequently spoke about the quality of this communication but less frequently spoke about it in the context of burnout. When they did mention it, respondents believed that communication that was unproductive, disrespectful, or impolite undermined the supportive aspect of the telemedicine service. One nurse who worked in the telemedicine unit at Site 05 mentioned that she tried to remain cognizant of the way that she speaks to her colleagues at the bedside, noting “The one thing is how we come across to people. People have a tendency sometimes to come across as a know-it-all.”

This communication also occurred from the ICU to the telemedicine unit, as a nurse from Site 05 described.

When I came here to work, I had just such high hopes. I mean I was like, “I was gonna help out all my coworkers on nightshift... You know anything they need, I was gonna get it for them!” And I was just really gung-ho. Well, I got in here and surprise, surprise. Some of the meanest things, some of the meanest things said to me came from my old coworkers... I just kind of felt like I was being shunned by my former coworkers... I felt like they didn’t view me as a colleague anymore. I was more like a pest. (Site 05, Telemedicine Unit)

3.4 DEMOGRAPHIC AND ORGANIZATIONAL CORRELATES OF CRITICAL CARE NURSES’ PERSPECTIVES OF BURNOUT

3.4.1 Statistically Significant Relationships

Results of the Chi-square analysis are presented in Table 5, below. Of the relationships examined, a few were statistically significant. First, nurses who work in the telemedicine unit were more likely to endorse the telemedicine unit as a place to work after a nurse experiences burnout in the ICU [χ^2 (2, N = 118) = 13.12, $p = 0.001$]. Work location also had a statistically significant relationship with endorsement of the idea that the telemedicine unit does not provide any support [χ^2 (2, N = 118) = 6.77, $p < 0.05$]. Respondents who worked in the ICU were much more likely to give this response.

Next, whether or not the telemedicine unit provides education was also statistically significant in some aspects of support endorsement. Nurses who worked in a location in which the telemedicine unit did not provide education were more likely to advocate the telemedicine unit for instrumental support [χ^2 (1, N = 97) = 7.54, $p < 0.05$]. These nurses were also more likely to endorse the telemedicine unit as a place to work after experiencing burnout from working in the ICU [χ^2 (1, N = 97) = 6.91, $p < 0.05$].

Finally, ANCC Magnet Hospital status showed statistical significance in regard to provision of informational support [$\chi^2 (2, N = 79) = 4.25, p < 0.05$] and support for new nurses [$\chi^2 (1, N = 79) = 5.17, p < 0.05$]. Nurses who worked in ICUs that did not have Magnet status were more likely to favor the telemedicine unit for provision of these types of support.

Table 5. Percentages of Nurses Who Endorse Support Provided by the Telemedicine Unit

Characteristic (n=# of nurses)	Emotional Support	Instrumental Support	Informational Support	Support for New Nurses	Place to Work After Burnout	No Support
Demographic Characteristics						
Years of ICU Experience (N=102)						
10 years or less	7.8	9.8	2.9	2.9	3.9	18.6
More than 10 years	5.9	16.7	6.9	7.8	11.8	12.7
Work Characteristics						
Work Location (N=118)						
ICU	11.9	19.5	4.2	5.1	4.2**	23.7*
Telemedicine Unit	2.5	4.2	4.2	4.2	9.3	4.2
ICU and Telemedicine Unit	0.0	2.5	0.8	0.0	1.7	0.8
Work Schedule (N=114)						
Full time	12.3	23.7	8.8	9.6	15.8	26.3
Part time	1.8	1.8	0.9	0.0	1.8	2.6
Casual	0.0	0.0	0.0	0.0	0.9	0.0
Typical Shift (N=63)						
Day shift	1.6	6.3	4.8	6.3	7.9	6.3
Night shift	12.7	15.9	1.6	1.6	3.2	14.3
Both	1.6	3.2	1.6	3.2	1.6	1.6

Table 5 Continued

Telemedicine Unit Contracts Education (N=97)							
Yes	11.3	13.4*	7.2	2.1	3.1*	23.7	
No	5.2	15.5	2.1	6.2	7.2	8.2	
Telemedicine Effectiveness (N=71)							
High	15.5	22.5	4.2	8.5	4.2	22.5	
Low	2.8	4.2	1.4	0.0	1.4	14.1	
ANCC Magnet Hospital (N=79)							
Yes	3.8	8.9	0.0*	0.0*	1.3	16.5	
No	13.9	21.5	6.3	7.8	5.1	19.0	

*Significant at $p < 0.05$ **Significant at $p < 0.001$

3.4.2 Relationships Approaching Statistical Significance

It is worth mentioning that additional tested relationships approached statistical significance. Respondents who worked in an ICU in which telemedicine had high effectiveness were more likely to endorse it for instrumental support [$\chi^2 (1, N = 71) = 2.80, p = 0.094$]. These respondents were also more likely to approve the telemedicine unit providing support for new nurses [$\chi^2 (1, N = 71) = 2.94, p = 0.086$.]

Respondents who worked in an ICU with Magnet status were less likely to endorse the telemedicine unit for provision of emotional support [$\chi^2 (1, N = 79) = 3.61, p = 0.057$] or instrumental support [$\chi^2 (1, N = 79) = 3.20, p = 0.074$].

Next, nurses who had ten years or less experience working in an ICU were more likely to perceive that the telemedicine unit provides no support [$\chi^2 (2, N = 102) = 3.32, p = 0.069$]. Furthermore, nurses with more than ten years of experience in working in an ICU were more likely

to endorse the telemedicine unit as a place to work after experiencing burnout in the ICU [χ^2 (1, N = 102) = 3.39, p = 0.065].

Work schedule, whether full time, part time, or casual, mattered for some endorsements of support. Nurses who worked full time were more likely to advocate the telemedicine unit as a place to work after experiencing burnout in the ICU [χ^2 (2, N = 114) = 5.58, p = 0.061].

4.0 DISCUSSION

Burnout is a growing issue among nurses who work in critical care settings. Much has been written about this problem, yet few evidence-based interventions have been proposed. Further, existing research has not sufficiently examined the ways in which ICU nurses perceive burnout, including its definitions and determinants, as well as coping mechanisms. The purpose of this study is to gain a better understanding of these elements within a sample of critical care nurses and to use this understanding to construct a conceptual model. This model can help to inform and to tailor interventions targeted to alleviate and prevent burnout in ICU nurses.

4.1 QUALITATIVE RESULTS

This section discusses the results from the qualitative analysis of the data from this study, including nurses' descriptions of burnout, nurses' perceptions of determinants of burnout, and nurses' opinions of how telemedicine affects burnout in the critical care setting. These results also inform modifications to the Job Demands-Resources Model in order to tailor it to the nurses who took part in the ConnECCT study.

4.1.1 Stress and Disengagement

The Job Demands-Resources model, repeated below in Figure 3, depicts exhaustion as the result of job demands, yet the nurses in this sample instead described it as feeling overwhelmed and

pressured. Though the nurses who took part in interviews alluded to feeling exhausted, they did not make a strong connection with it as a downstream result of job demands. Disengagement remained a similar feature in these results and in the JD-R model, as the nurses in our sample frequently spoke about feeling as if they needed to transition out of working in the ICU in order to cope with the symptoms of burnout. Leaving the ICU for other employment is a way for the nurses to disengage from the ICU workload and environment that lead to the development of burnout symptoms. In this case, disengagement acts as a protective factor and resource, since it helps the nurses to cope and to perhaps lend their skills to patient care in a different way, rather than stay in the environment and perform care that they perceive as ineffective or may lead to poor outcomes.

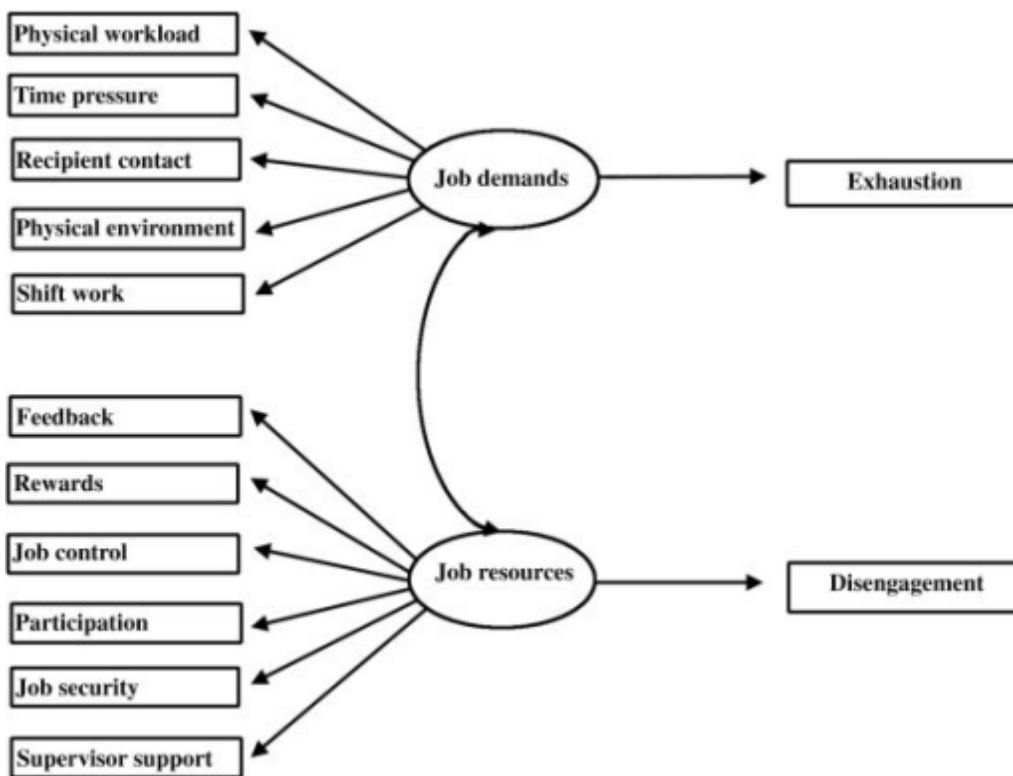


Figure 3. The Job Demands-Resources Model
 From Demerouti et al., 2001

This is an area in which telemedicine may assist with nurses who are experiencing or are at risk of developing burnout. A number of the nurses in our sample noted that working in the

telemedicine unit helped them to feel engaged with their profession once more. It is important to remember that in order for nurses to take advantage of the benefits of working in the telemedicine unit, the telemedicine unit must ensure that nurses who work in the ICU are aware of this option, and the telemedicine unit should take an active role in recruiting nurses to work there. In addition, administrators and managers in the telemedicine unit should also remain aware of the issues that may have brought nurses to work there and strive to maintain an optimal work environment for their nursing staff.

4.1.2 RN Personality Traits

The nurses in our sample attribute job demands, and subsequently burnout in the ICU, to a number of sources. The innate personality traits of the nurses themselves may make some nurses more susceptible to burnout. The nurses included in our sample, like many other ICU nurses, identify strongly with their profession and perceive that certain traits, such as control and strength of will, contribute to their success. These perceptions are similar to findings of other research that determined a correlation between nurses who have a hardy personality, including traits of needing to be in control, challenge, and commitment, and likelihood of developing burnout (Garrosa et al., 2008). Other research linked nurses who value autonomy more highly with a greater likelihood of developing the depersonalization component of burnout (Bakker et al., 2006). However, the nurses in our sample did not offer ideas for ways to moderate the effects of these traits on burnout.

While the telemedicine unit cannot directly assist with the innate qualities that nurses may possess, staff who work in the telemedicine unit can keep these traits in mind when communicating with and assisting nurses who work in the ICU. Nurses to whom control is important will respond

better to the telemedicine unit when orders and advice are presented as shared decisions between colleagues.

4.1.3 Emotional Issues and Emotional Support

Emotional issues, according to the nurses in this study, are a strong determinant of burnout among ICU nurses. Given the prevalence of moral distress and compassion fatigue in the ICU, it is not surprising that the nurses in our sample often spoke about them in relation to the development of burnout. According to the nurses with whom we spoke, and as depicted in the model in Figure 2, emotional support is an important resource against the negative effects of these issues in the ICU. Interventions targeted toward alleviating burnout in the ICU should consider including an emotional support component. Since the nurses we spoke with noted that they are most likely to look to their coworkers for support, perhaps a peer support model could be most effective here.

Telemedicine has the potential to provide emotional support for bedside staff. There are a variety of forms for this support. Nurses who work in the telemedicine unit have the ability to provide positive feedback to their colleagues at the bedside, as well as give them space in which to express their frustrations. However, most of the nurses with whom we spoke qualified these beliefs by explaining that the acceptance of this support depends very much upon the quality of the relationship between the nurses. That is, nurses who already know each other are more likely to give and to receive emotional support, and the more intense the support, the stronger the nurse to nurse relationship should be.

This also holds true for the potential of telemedicine to provide support for bedside nurses undergoing compassion fatigue and/or moral distress. These are powerful experiences that frequently occur in the ICU, and in order to be able to cope with them effectively over the long

term, bedside nurses may require more intense and more frequent emotional support. The nurses in our sample noted that emotional support for these challenges is, for them, more effective when delivered in person, rather than from a face on a screen. These qualifications, however, do not mean that telemedicine cannot provide emotional support for nurses; our data do show that nurses value this support and that it is both welcome and effective for scenarios of less intensity.

4.1.4 Instrumental Support

Instrumental support is another type of social support that our data suggest could be key in alleviating burnout among ICU nurses. Instrumental support as a resource can assist nurses with tasks that are physically difficult and lead to prolonged fatigue, such as moving heavy patients. It can also assist with task overload and with other tasks that take nurses away from patient care and contribute to burnout over time. Interactions with physicians is another demand of ICU nursing that participants felt contributed to burnout. Instrumental support may impact the relationship between these factors either by making it easier for nurses to contact physicians and thus, spending less time making telephone calls. An intervention for burnout should consider this aspect of nursing, as well as the quality of interactions between physicians and nurses when the nurses' phone calls wake them up at night. In this case, instrumental support may look like giving both professions training or a tool kit to facilitate more productive interactions in these situations.

The data from the ConnECCT study showed that the process of ICU telemedicine service delivery is not always effective; however, the data from this study suggest that ICU telemedicine has a number of benefits for bedside nurses. In the telemedicine unit, critical care trained staff are dedicated to providing assistance to the staff at the bedside in the ICU. When the system works effectively, the telemedicine staff take part of the cognitive burden and repetitive work from the

nurses in the ICU. By removing these burdens, bedside nurses are better able to focus on patient care and feel as if the care that they are providing is necessary and effective. Since reduced efficacy is a core component of burnout, the result that ICU telemedicine can be a significant buffer against the development of burnout is encouraging. Furthermore, that instrumental support was mentioned by a majority of the nurses in our sample suggests that it is one of the most accepted and most valued consequences of ICU telemedicine. It is important to note that the specific types of instrumental support provided by the telemedicine unit vary by the needs of each ICU, and providing support that is not perceived as useful may add to the stress and workload of the bedside staff. This issue was noted by some of the nurses in our sample. It is recommended that institutions that want to implement ICU telemedicine programs should examine the needs of the ICUs that receive services so that they do not inadvertently increase the burden on the bedside.

4.1.5 Informational Support

Our results indicate that ICU nurses value informational support. This type of support can affect the relationship between interactions with physicians and workload and task issues and the development of burnout. ICU nurses often have to make rapid decisions about patient care in the absence of other staff. Having necessary information and easily available staff for advice, could reduce stress and cognitive burden among nurses. They may also lead to more favorable patient outcomes by assisting nurses with unfamiliar knowledge or procedures.

This type of support is one of the main types provided by the telemedicine unit. Indeed, it is a driving force behind the development and implementation of the service and is not likely to change. What can change, however, is the manner in which the information is delivered. As noted above, the staff in the telemedicine unit should take care when they present or offer the information

in order to provide good customer service and to partner with the nurses in the ICU. Staff in the telemedicine unit should also ensure that the information that they provide is needed and relevant.

4.1.6 Effects on Nurses' Career Trajectories

One of the most striking findings from our interviews was the effects that ICU telemedicine has on both ends of nurses' career trajectories. It has the potential to be a valuable support for nurses who are new to working in the ICU by offering mentorship, additional on-demand education and training, and emotional support. These nurses are especially vulnerable to the development of burnout, and providing additional support may help them develop into more confident, competent critical care nurses. Furthermore, it may also prevent attrition by supporting them during their vulnerable orientation and early service periods. It is important to note that some of the sites that we spoke with implemented mentoring programs for novice nurses. Inadequate resources were often a factor in their limited success. Telemedicine programs are resource intense, and since patient monitoring and care are top priorities, other aspects of the programs can fall by the wayside. Institutions that want to implement ICU telemedicine programs should consider the cost-benefit ratio of this potential use of the program. While there is an additional expense to dedicating nurses in the telemedicine unit to mentor new nurses in the ICU, our results suggest that there may be a downstream benefit to the ICU with more stable staffing, retention of experienced nurses, increased staff satisfaction, and improved patient outcomes.

At the other end of the career trajectory, nurses with longer tenure consistently told us that they were grateful that the telemedicine unit provided them with the opportunity to extend their careers. Nurses have a strong professional identity, and it can be frustrating for a nurse if she wants to continue to provide patient care but is physically unable. The telemedicine unit is an

ideal location for these nurses to use their intellectual capital to provide patient care and to contribute to the development of new nurses without further wear on their bodies. Nurses who worked in the ICU also expressed their comfort knowing that they had seasoned nurses to support and assist them.

There are, however, some drawbacks to this staffing model. First, a number of nurses who work at the bedside noted that the nurses who worked in the telemedicine unit were not always familiar with newer technologies and could not assist patients who needed care from certain medical devices. Next, nurses in the telemedicine unit also alluded to feeling as if the bedside nurses had lost credibility with them, since they had been away from the bedside and may not remember the work environment and workflow of the bedside. They perceive that this makes the nurses in the telemedicine unit less likely to understand the way that they balance their workloads and tasks at the bedside and may, in fact, add to their stress. This may increase the likelihood of developing burnout in the future. Again, this is a potential consequence worth noting in thinking about the staffing model of an ICU telemedicine program.

4.1.7 Relationships and Integration

Finally, a number of respondents did not perceive that ICU telemedicine has a role in the burnout of critical care nurses. One of the reasons for that perception may be that the levels of engagement with and use of telemedicine services varied among the ICUs in our sample. Nurses who have less frequent interactions with the telemedicine unit likely have a different perception of it than do nurses who use it more frequently. Nurses who are more frequent users of the service are more likely to recognize it as a resource and to understand the extent to which that resource is beneficial

to them. Institutions who provide or use ICU telemedicine services should consider the level of integration of the service with the bedside so that more nurses have exposure to its benefits.

The level of integration also affects the relationships between nurses who work in the telemedicine unit and nurses who work at the bedside. Nurses with whom we spoke noted that their use of telemedicine for emotional support varies with their relationship to the staff who work there, and that they are more likely to seek emotional support from nurses with whom they already have an established relationship. Research suggests that emotional support can be a protective factor in the development of moral distress and compassion fatigue and, subsequently, burnout. Again, institutions wanting to promote this aspect of ICU telemedicine should consider integration of the service with the ICU, particularly shared staffing models or in-person events for relationship building.

4.1.8 Adaptation of the Job Demands-Resources Model

Figure 4 depicts the revised Job Demands-Resources Model tailored based on interviews with the nurses who took part in this study. In the original JD-R model, job demands lead to exhaustion, yet as described above, the nurses in this sample perceive that job demands lead to feeling overwhelmed and pressured. Thus, exhaustion was replaced in the tailored JD-R model, shown in Figure 4 below.

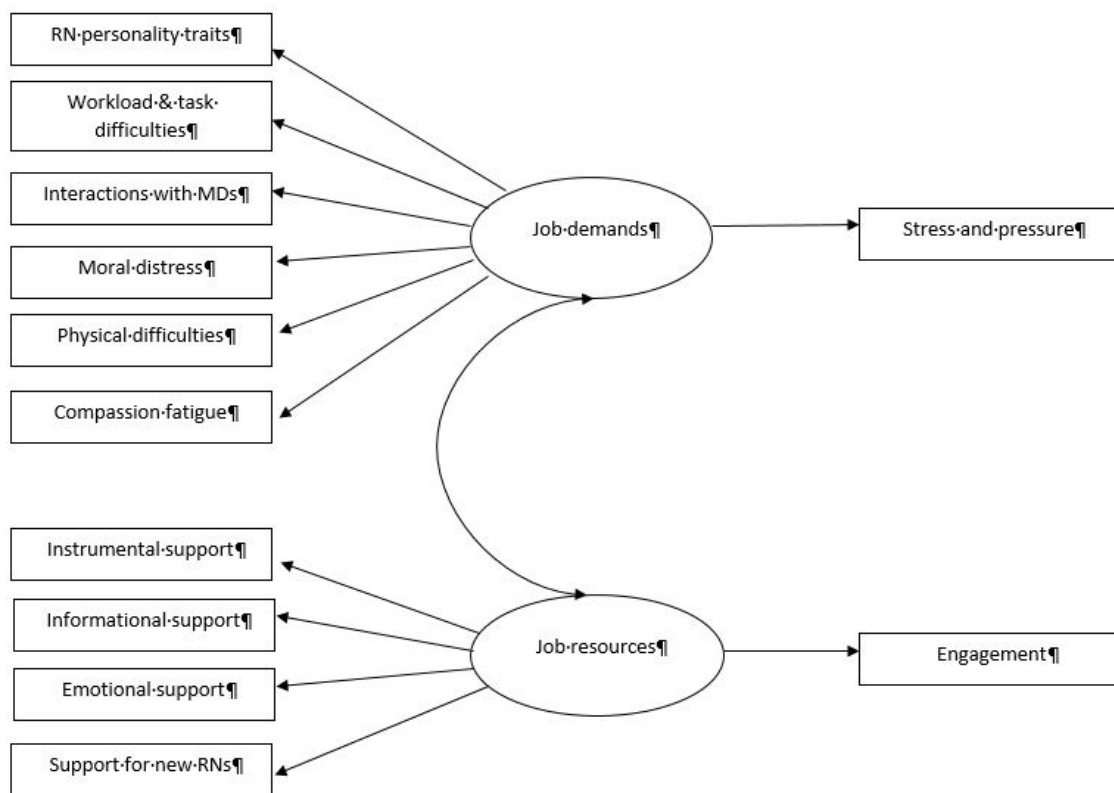


Figure 4. The Job Demands-Resources Model for the Role of Telemedicine in Burnout among Critical Care Nurses

A common theme in the data was the nurses’ feelings of needing to transition out of working in the ICU as a way to cope with burnout. Because of the importance of this theme, the concept of disengagement was retained in the tailored model, though it was named “engagement” for consistency with the positive items. As noted above, disengagement acts as a protective factor and resource when nurses leave the environment that contributes to burnout and lend their skills elsewhere.

The tailored JD-R model in Figure 4 demonstrates the sources of job demands reported by the nurses in the study sample. The tailored model incorporates the innate personality traits of nurses; emotional issues, such as moral distress and compassion fatigue; workload and task issues;

negative interactions with physicians; and the physical difficulties of bedside nursing into the job demands of critical care nurses.

Since emotional issues are perceived as a strong determinant of burnout among the nurses in the study sample, it is not surprising that they also reported that emotional support is a key resource to counter the effects of moral distress and compassion fatigue. Similarly, the nurses in the study sample noted perceive that instrumental support is another essential resource for bedside nurses in the ICU. This support can alleviate fatigue, as well as provide nurses with more time to spend with their patients. Emotional support and instrumental support are included as job resources in the tailored model depicted in Figure 4.

One of the main findings of this study is the importance that respondents placed on the ability of the telemedicine unit to support new nurses. In light of this, the job resource of “Support for new RNs” was added to the tailored model, as depicted in Figure 4. Support for new nurses is a significant resource for ICU nurses in all stages of their careers. Additional training and support for new members of the team benefits all team members, since it reduces the burden of education, training, and oversight for supervisors and other experienced nurses. Furthermore, this support may be a key factor in nurses’ decisions to remain employed in the ICU; this retention saves the costs associated with hiring and training new nurses, as well as those associated with maintaining adequate staffing while positions are vacant. Additionally, nurses who remain in the ICU are able to, in turn, provide improved patient care as they gain more experience. They are also better able to support their coworkers at the bedside, further improving patient care and staff satisfaction outcomes.

The transition of more experienced nurses to working in the telemedicine unit is included in the “Engagement” domain of the adapted model. The option of working in the telemedicine

unit, and therefore, remaining engaged in critical care nursing, is a valuable option for many nurses who are experiencing burnout. The nurses we spoke with recognized the significance of this option because it allowed them to remain involved with patient care. Experienced nurses who work in the telemedicine unit can also lend their expertise to new nurses who are working at the bedside, contributing to the other types of support provided by the telemedicine unit and described by our sample as protecting against the development of burnout.

4.2 QUANTITATIVE RESULTS

4.2.1 Work Location

For certain types of support, the respondent's work location made a difference. For example, nurses whose primary work location was the telemedicine unit were more likely to endorse it as a place to work after they experienced burnout in the ICU. This may be because all of the nurses we spoke with who work in the telemedicine unit were also experienced ICU nurses. They were in a unique position to compare the environment of the telemedicine unit with that of the ICU and may have noticed the effects that their new work environments have had on their burnout symptoms. Furthermore, some respondents told the study team specifically that they chose to work in the telemedicine unit because they were no longer able to work in the ICU, either for physical or emotional reasons. These results support the idea that telemedicine units are useful locations for nurses who want a break from bedside nursing but want to continue to contribute to patient care.

Nurses who work primarily in the ICU were more likely, however, to endorse the idea that the telemedicine unit does not offer support. Telemedicine usage was generally low in the ICUs included in the study, and perhaps the nurses who participated in interviews did not have enough exposure to their telemedicine units to have an idea of how they could support them. Furthermore, among nurses who worked in an ICU where an intensivist was available, there was a belief that the telemedicine unit was unnecessary. This belief could also contribute to the feeling that the telemedicine unit does not offer certain types of support. This relationship suggests that the level of integration between telemedicine units and partner ICUs matters for perceived provision of support. Telemedicine units that are interested in affecting burnout should strive for tighter integration and visibility of services.

4.2.2 Education as a Contracted Service

Interestingly, respondents who worked in an ICU in which education was not a contracted service from the telemedicine unit were more likely to endorse it for providing instrumental support or as a place to work after experiencing burnout in the ICU. It is likely that these telemedicine units are providing education regardless of contract, and this education is perceived as instrumental support. For example, a nurse working in the telemedicine unit may check lab results as assistance to a bedside nurse; the telemedicine unit nurse's finding of a critical lab value and subsequent ordering of a treatment not familiar to the bedside nurse could be seen as both education and instrumental support.

As for nurses in these units who believe that the telemedicine unit is a good place to work after experiencing burnout, it may be that since their ICUs did not contract for education, that type of support is not a priority to unit leadership. Perhaps the nurses we spoke with from these units

have a different understanding of burnout because of this lack administrative support. They may feel the need to leave for an environment that they believe supports education more highly. More work is needed in order to understand ICU leadership's decisions to contract certain services from telemedicine units and those decisions' association to the organizational culture of the unit.

4.2.3 Magnet Status

Interview respondents who work in ICUs with Magnet status were less likely to endorse the telemedicine unit with the provision of informational support and support for new nurses. Indeed, none of these nurses endorsed either kind of support. Since Magnet hospitals are those that have demonstrated the ability to attract and retain new nurses, it is likely that these ICUs have strong support for new nurses and additional support from the telemedicine unit is not needed.

Furthermore Magnet hospitals are those that have also demonstrated support of nurses' professional development. High quality and effective continuing education is one of the ways in which this support occurs in Magnet hospitals. Again, it may be that informational support from the telemedicine unit is not needed in these units. The quality of the organizational environment of Magnet hospitals is likely to also contribute to the relationships with emotional and instrumental support that were approaching statistical significance.

4.2.4 Years of ICU Experience

Nurses who had fewer years of experience working in an ICU were more likely to support the belief that the telemedicine unit offers no support or does not affect burnout. Though this relationship was not statistically significant, it is important to consider in the context of burnout.

It may be that newer nurses are not yet experiencing burnout and, therefore, are not cognizant of the ways in which the telemedicine unit alleviates it in nurses with longer tenures in the ICU. It may also be that these nurses are not aware of the determinants of burnout and are unable to make the link between these determinants and the ways in which telemedicine can affect them.

Similarly, newer nurses were also less likely than more experienced nurses to endorse the telemedicine unit as a place to work after experiencing burnout in the ICU. If these nurses are too new to have developed burnout, they are unlikely to be thinking about the telemedicine unit as a way to alleviate it. Some of the telemedicine units that took part in the study required their staff nurses to have many—ten, in some cases—years of experience in an ICU to qualify to work in the telemedicine unit. It may also be that nurses with less experience are not yet considering the telemedicine unit for this reason.

4.2.5 Work Schedule

The relationship between work schedule and endorsement of the telemedicine unit as a place to work after experiencing burnout in the ICU also approached statistical significance, with nurses who work full time more likely to favor this support. This relationship suggests that nurses who work full time may have more exposure to the telemedicine unit and have a better understanding of the ways in which it can alleviate burnout. They may also have more contact with colleagues who work in the telemedicine unit and have heard the reasons that brought them to work in the telemedicine unit. Finally, nurses who work full time are likely to have a higher prevalence of burnout and may be more likely to be considering a change in employment to alleviate it.

4.2.6 Telemedicine Effectiveness

Endorsement of the telemedicine unit as a place to work after experiencing burnout also had a relationship approaching statistical significance among nurses who worked in ICUs characterized with high telemedicine effectiveness. Findings from Aim 2 of the parent study suggest that there are a number of characteristics that contribute to an effective telemedicine program. Two of these characteristics are the level of integration and the quality of the relationship between the ICU and the telemedicine unit. It may be that a higher level of integration and better relationships contribute to a greater understanding of the way in which the telemedicine unit functions and the way in which it can alleviate burnout in a nurse, especially the feeling of stagnation in her career. More work is needed to obtain a clearer understanding of this mechanism.

4.3 LIMITATIONS

Several limitations affect the generalizability of this study. First, because this study was conceptualized after data collection for the parent study was complete, we did not specifically ask the nurses to define burnout or to describe to us their perceptions of burnout during data collection. If we had been able to do this, we may have obtained more detailed information from the nurses in our sample. As well, we did not assess the study sample for burnout. It may be that nurses who have burnout have a different perception of supports needed than do nurses who are not experiencing burnout. Nurses who are experiencing burnout could have a personal understanding of how the telemedicine unit did or did not support them.

Next, resource constraints limited data analysis for this study to only transcripts from interviews with nurses. Since discussions about burnout sometimes spontaneously arose during focus groups or observations, including those sources in the analysis may add another dimension to the findings. Furthermore, data from interviews with telemedicine unit and ICU/hospital administrators could also add an additional layer of understanding to the effects that ICU telemedicine has in the larger system, rather than only with individual nurses. In addition, the number of nurses who took part in interviews was small. More statistically significant relationships may be uncovered with a larger sample size.

Finally, the nurses whose data were included in this study represent a convenience sample of nurses that took part in the parent study, which was unrelated to burnout. The nurses who took part in the parent study may differ in some way from other critical care nurses, and these results may not be generalizable to all critical care nurses. Future work examining perceptions of burnout among critical care nurses should look to include a random sample of critical care nurses from more diverse settings. Future work should also specifically solicit information about nurses' perceptions of the determinants of burnout.

5.0 CONCLUSION

Nurses are the hub of patient care in the ICU. They not only coordinate time-sensitive care for medically complex and extremely ill patients, but they also perform much of that care themselves, all in an atmosphere of stress and urgency. Nurses working in the ICU must independently make decisions about patient care, manage competing wishes about end-of-life decisions, and maintain vigilance when monitoring patients. Thus, critical care nursing is a profession that carries a high cognitive burden, yet nurses often do not receive the support they need in order to provide effective care for their patients. Ideally, this support would come from supervisors, administration, and colleagues, in the form of additional staffing, conflict management, and support for moral distress. Unfortunately, these supports are often lacking, and that combined with stress leads to high rates of burnout among critical care nurses. A growing staffing shortage combined with older and more acutely ill patients means that even more strain will be placed on nurses. This will result in even higher rates of burnout, as well as reduced quality of patient care and poorer patient outcomes.

Telemedicine is a technology increasingly implemented in ICUs in order to complement the services provided by the bedside team. It has been demonstrated to have a positive effect on patient outcomes, yet since it also alters the workload, staffing ratios, and resources available to nurses, it may also affect the organizational climates of the ICUs for which they provide services.

The main purpose of this study was to understand how a sample of critical care nurses define and experience burnout, the ways in which they perceive that ICU telemedicine can affect burnout, and correlates between characteristics of the nurses and endorsement of beliefs about supported provided by ICU telemedicine. Another purpose of this study was to refine an existing

model of burnout in order to make it more relevant to critical care nursing and to include the effects of ICU telemedicine.

Using qualitative data allowed a unique insight into the experiences of these nurses. They described burnout as feeling overwhelmingly stressed and disengaged from their work. To cope, they often rely on emotional support from trusted coworkers, black humor, and in extreme cases, leaving the ICU to work elsewhere. Respondents noted that they wanted fewer tasks they viewed as repetitive or unnecessary so that they could spend more time with their patients. They also wanted more support in morally distressing situations and in frustrating interactions with physicians. Finally, a number of respondents noted that nursing is physically difficult, and the toll that their work takes on their bodies can influence and hasten the decision to stop working in the ICU.

The nurses we spoke with had mixed feelings about the role of ICU telemedicine in burnout. Most of the respondents in our sample did not feel that this intervention had a significant effect on their experiences at the bedside or in the organizational climate of the ICU. The telemedicine units included in the parent study had varying levels of integration with their partner ICUs, and nurses who work in ICUs with lower levels of integration do not often use the support provided by the telemedicine unit. Indeed, they are not always aware of the potential supports that are available. Furthermore, the nurses in the study sample often mentioned that they preferred to receive emotional support from coworkers that they already know and trust, rather than from staff in the telemedicine unit with whom they may not already have a relationship.

Some respondents, however, offered ways in which the telemedicine supports the bedside and alleviates antecedents or symptoms of burnout. One of these ways is through availability of telemedicine staff to provide informational support. Bedside nurses who use the telemedicine unit

value the ability to consult with experienced nurses about patient care. They also value the telemedicine staff shares or even assumes responsibility of tasks that take time away from patient care, such as charting or coordinating communication and services outside of the ICU. These supports help reduce the burden on the bedside nurse and allow her to focus on her patients.

Telemedicine units are also providing support to nurses at both ends of their career trajectories. For new nurses, the staff in the telemedicine unit help provide education and training. In some cases, they also provide emotional support for critical care nurses who may not have yet developed confidence at the bedside. Nurses who are new to working in the ICU environment are especially vulnerable to the effects of its negative properties. Offering additional support to them during this transition period could alleviate stress and help build confidence, leading to reduced turnover and improved patient care. Moreover, providing this support via telemedicine does not add burden to nurses at the bedside.

For nurses who have had longer tenure in the ICU, the telemedicine unit is a place for them to work when they are no longer able to work at the bedside. Nurses who transition to providing remote care may be physically unable to work at the bedside anymore, or they may have experienced burnout and felt stagnant and disengaged. Many of the nurses whom we spoke with who made this transition wanted to continue to provide patient care but understood that they needed to step away from the bedside. Creating this additional option for older nurses is a way for them to retain their professional identities, as well as sharing their wisdom and experience with other nurses who are still at the bedside.

Results from the analysis of demographic and organizational factors and their relationships to nurses' perspectives of support offered by the telemedicine unit suggest that relationships and integration are integral to effective support. As noted above, most respondents did not perceive

that the telemedicine unit was able to provide support against the development of burnout. While this may mean that ICU telemedicine does not have a role in burnout, it is possible that many of the bedside staff in our study were not aware of all of the types of supports that the telemedicine unit can offer because they did not have enough familiarity with the service. This familiarity can be built with increased integration and relationships, and this is a direction for future work.

5.1 IMPLICATIONS FOR RESEARCH

The results of this work suggest that burnout may be experienced differently by members of different professions. The nurses who took part in interviews for the parent study perceive burnout in unique ways than has been described in the literature. Though much work has already been done to examine and to describe burnout among nurses, the qualitative methods used in this study brought more nuance and detail to the nurses' descriptions of burnout. Future research on burnout in this profession—and in other professions—could return to the methods used by earlier researchers and seek to describe burnout using personal experiences from those that suffered from it.

This work also suggests that telemedicine may have additional unintended consequences that were not envisioned during the planning stages. Understanding these consequences is an important aspect of marketing and continued refinement of telemedicine. A direction for research is to continue to explore telemedicine's role in burnout, as well as the way it impacts nurses' job satisfaction and the ICU organizational environment. Telemedicine services can be refined to either enhance or reduce effects on these aspects of nursing care.

This work included data from a small sample of nurses who self-selected to take part in interviews. Though the study team did reach saturation at each study site, the perspectives of this sample may not be generalizable to those of all critical care nurses or even all critical care nurses who have some involvement with telemedicine. Future work should address this issue. Also, as noted above, this study had a small sample size; additional themes and stronger relationships should emerge with a larger sample size. Finally, future work should also specifically examine burnout, either by measuring it or by asking more focused questions.

5.2 IMPLICATIONS FOR PRACTICE

This work emphasizes the continued need to improve the organizational environment for critical care nurses. ICU nurses are providing care for very ill patients within a system that is becoming increasingly strained. Nurses cannot continue to work within this system while providing quality care for patients. ICUs must work to attract and to retain nurses, starting with new graduates and continuing throughout the career trajectory. Nurses who are supported and feel valued are more likely to intend to remain employed in their ICUs and to be engaged with and committed to their patients. One way for ICUs to do this is to examine the workflows of nurses and remove any redundant tasks or reassign tasks that may not fall directly under the scope of nursing. This is also an area in which ICU telemedicine can assist; many tasks can be performed remotely, leaving the bedside nurse more time to spend completing hands-on patient care.

The nurses we spoke with preferred to receive emotional support from coworkers with whom they have already established a positive relationship. This is support that the bedside team should provide and maintain. For example, many ICUs have a chaplain who is a counseling

resource for bedside staff. Though telemedicine staff may not be able to effectively provide emotional support through a camera, there are other ways that they may be able to support nurses in the ICU. Some telemedicine units contact organ donation organizations after a patient's death so that the bedside team can assist the family. Nurses also often act as mediators during end-of-life discussions in which physicians and families have differing opinions; a role for the telemedicine unit may be to assume the responsibility for mediation in order to remove the nurse from that role.

Mentoring new bedside nurses is a key support that could be offered by the telemedicine unit. Some of the telemedicine units who took part in this study attempted to institute formal mentoring programs, with limited success. These programs were ultimately too costly, too time-consuming, or simply lost the attention of administration. Supporting and retaining new ICU nurses is an important strategy in an era of high turnover and staffing shortages. Mentoring is, of course, possible in less formal arrangements. Including more information about telemedicine and the services it provides should be an essential part of the orientation process for all new nurses whose ICUs use this technology. Telemedicine staff can also make regular check-ins with new nurses, to give them an opportunity to ask questions or to voice concerns.

One of the key findings of this study is the importance of the telemedicine unit as a place for critical care nurses to work once they are no longer able to work at the bedside. Telemedicine units and their partner ICUs should ensure that nurses are aware that this is an option for them, and this option should be made available to nurses before they want to leave nursing entirely. The nursing workforce is aging, and if too many nurses leave the bedside, a wealth of knowledge and experience will be lost. This loss will leave newer nurses at a disadvantage as they have to learn

everything that their older peers could have passed on to them. Telemedicine is an optimal conductor for this knowledge and experience.

For ICUs that already use telemedicine services, the service delivery can be leveraged in order to provide additional support for nurses at the bedside or to provide employment for nurses who have experienced burnout at the bedside. This support may be helpful in reducing burnout among nurses for as long as the services are provided. However, some ICUs do choose to end their contracts with telemedicine service providers. Moreover, the life span of this technology is not known; that is, we do not yet know how long this service will be the forerunner of options until a newer or more desirable service is developed.

Another consideration is the cost of telemedicine services. The cost to obtain and to continue telemedicine services can be considerable for a hospital, and many hospitals may choose not to have telemedicine services for that reason. Some of these hospitals may have resource constraints, such as inadequate staffing. Telemedicine services may be needed but are unlikely to be implemented.

In light of these issues, changes that improve the organizational environment of the ICU might better serve the nurses who work there. These changes include shared decision making between supervisors and staff, adequate staffing, and on-site support for emotional issues. These are changes that are not dependent on technology and do not need to be as resource-intensive as implementation of telemedicine services. However, if an ICU does choose to implement telemedicine services, it should be aware of the potential benefits it has to alleviate and prevent burnout among nurses at the bedside.

5.3 SUMMARY

Despite the research focus on burnout among critical care nurses, a model of burnout has yet to be developed for this population. The work presented here is an initial attempt at constructing such a model. The interviews from which the majority of data for this study came are a unique addition to the development of the model because they include the stories and lived experiences of nurses who are familiar with the critical care environment and have often experienced burnout first hand. While the Job Demands-Resources model of burnout is a useful general model of burnout, it does not capture the distinctive environment of the ICU nor the particularities of critical care nursing. Developing and refining a model of burnout for this population is a fundamental step in generating a functional intervention for it. As noted earlier, few evidence-based burnout interventions exist, and none of those have exhibited long-term effects. A model produced in part from perceptions of critical care nurses will have more relevance to them and thus, an intervention based upon that model has a greater likelihood of obtaining long term effects.

The nurses who took part in interviews for this study openly described the nuances of their jobs that make them like no other—not even other nursing jobs. While the Job Demands-Resources model incorporates some of the job demands experienced by critical care nurses, it does not adequately include the resources that the respondents in our study sample mentioned were important to them.

This study revealed that the key features of burnout for this population are an overwhelming feeling of stress and a sense of stagnation in one's career. The key mechanisms that lead to burnout are difficulty managing heavy workloads and their associated cognitive burden, repeated instances of moral distress, and compassion fatigue. An interesting finding of this study is that the nurses named stress as a mechanism of burnout as well as one of its outcomes.

It may be that since stress is omnipresent in their work lives, it causes them to confound it with an outcome of their jobs. Another contributing factor might be the tendency of people to misname the mental and physical exhaustion that result from stress as stress itself.

Telemedicine has the potential to prevent the development of burnout in critical care nurses. One way that it could do this is to increase the resources available to critical care nurses. These resources include instrumental, informational, and emotional support that buffer the stressors of bedside nursing in the ICU. Another resource from telemedicine is assistance for nurses who are new to the ICU, providing them with needed support to help them through the difficult initiation period and remain engaged and committed to their work in the ICU. Telemedicine also has the potential to assist nurses who have already developed burnout by offering them a respite from the environment and the stressors that caused their burnout.

APPENDIX A: CODEBOOK

Node	Definition
Emotional Issues	Issues that cause emotional difficulty for nurses in the ICU, such as moral distress, patient codes, compassion fatigue, and patient and family interactions.
ICU Environment	Descriptions of the emotional environment of the ICU, such as high stress, sad, and incongruent expectations.
Physical Difficulty	Ways in which nursing is hard on the body or causes physical injury.
Workload and Task Issues	Tasks that cause frustration for nurses, take them away from patient care, cause cognitive burden, or place pressure on nurses. For example, interactions with MDs, locating other staff, working long hours, heavy workload, or time pressures.
Emotional support	Ways in which nurses are supported emotionally, such as receiving positive feedback or venting/debriefing.
Instrumental support	Ways in which nurses are assisted with tasks, such as adequate staffing and adequate resources.
Informational support	Ways in which nurses are supported with information or decision making, such as intellectual capital and support for inexperienced staff.
Burnout Description	Ways that nurses experience, describe, or perceive burnout.
Coping Mechanisms	Methods that nurses use to cope with burnout or symptoms of burnout.
TU Informational Support	Ways in which the telemedicine unit provides informational support, such as seasoned RNs giving information and advice
TU Emotional Support	Ways in which the telemedicine unit provides emotional support.
TU Instrumental Support	Ways in which the telemedicine unit provides instrumental support.
Mentor for New RNs	Ways in which the telemedicine unit supports new RNs.
TU Place to Work After Burnout	Experiences of nurses working in the telemedicine unit after burnout
TU Increase	Ways in which the telemedicine unit exacerbates burnout, such as adding to workload at the bedside.
TU No Change	Perception that the telemedicine unit does not affect burnout.

APPENDIX B: CONNECCT INTERVIEW SCRIPTS

B.1 INTERVIEW SCRIPT - ICU

Introduction

The purpose of this interview is to learn your opinions regarding the use of telemedicine in intensive care. We are trying to identify the factors that make telemedicine effective in the ICU. We would also like your opinion about what barriers and facilitators may exist to telemedicine use. Your answers will be kept completely confidential; no one will be able to associate you with your answers or with your hospital. You will be identified by an ID number and profession and not by name.

Begin recording and make sure to state the **date, time, and participant ID number and profession.**

Background

1. How did you become interested in working in an ICU?

Starting to Use Telemedicine

2. What were the goals your organization hoped to achieve by using telemedicine in the ICU?

3. Has the adoption of telemedicine in achieved these goals?

→ If yes, how was telemedicine able to achieve these goals?

→ If no, what has prevented achieving these goals?

4. Were you here when this ICU first started using telemedicine?

→ If yes,

- a. How was telemedicine introduced to the ICU staff?

- i. Who did the introduction?

- ii. How was the training organized?

- iii. What was involved?

- a. How was telemedicine received by the ICU?

→ Has this changed over time?

→ If yes, what brought about the change?

→ If no,

- a. Did you hear stories about how telemedicine was received by the ICU?

- b. What did you hear?

5. When you first started working in this ICU, how were you oriented to telemedicine?

- a. Has the orientation process changed over time?

→ If yes, how has it changed?

→ If yes, why did it change?

Structure and Process

6. What services does telemedicine provide for the ICU?
 - a. Do they assist in compliance with evidence-based practices? CMS Quality Measures?
→ If yes, walk me through how they assist (active, passive, routes)
7. During a typical shift, what do they do in the tele-ICU?
8. What is the role of the tele-ICU in patient care?
 - a. Are there other ways you describe ICU telemedicine besides as a 'second set of eyes' or as 'backup'?
 - b. How is responsibility distributed between the ICU and the tele-ICU?
 - c. How is accountability distributed between the ICU and the tele-ICU?
9. Has telemedicine had an impact on patient outcomes? (probe for monitoring, emergencies, and evidence-based practices)
 - If yes, how has it had an impact on patient outcomes
 - If no, what have been the challenges?
10. What are challenges to noticing **early** patient deterioration or status changes? [**Probe for:** workload, unit layout, experience level, type of deterioration—RR, HR, BP, Pulse Ox, alarm fatigue]
11. Please describe any circumstances that contribute to a delay in noticing **late** signs of deterioration. [**Probe for:** workload, unit layout, experience level, type of deterioration—RR, HR, BP, Pulse Ox, alarm fatigue]
12. When does the tele-ICU help with patient alarms?
 - a. How do they help?
 - b. Are patient alarms in the ICU and tele-ICU set at the same thresholds?
13. What are challenges for the tele-ICU in noticing patient deterioration or status changes? [**Probe for:** role of alarm fatigue, responsibility]
14. How does telemedicine affect your workload or workflow?
15. What happens when the tele-ICU makes a clinical recommendation for one of your patients? (Probe for why or why not recommendation is acted upon)
16. Can you tell me a story of a time when telemedicine worked well? (explore what might of happened if telemedicine **was not** involved or available)
17. Can you tell me a story about a time when telemedicine didn't work well?

18. Have you ever met clinicians in the Tele-ICU in-person?
 - If yes, in what circumstances have you met?
 - If yes, how does this affect how telemedicine is used?
19. How would you describe your relationship with tele-ICU unit?
20. What does the tele-ICU do to maintain/build relationships with the ICU?
21. For the tele-ICU, what is the **key feature** that makes a difference in how well telemedicine works for this ICU?
22. For the ICU, what is the **key feature** that makes a difference in how well telemedicine works?
23. Are there ever disagreements/conflicts/tensions with the tele-ICU?
 - If yes, we would like to know more about when this happens. Can you walk me through a specific example of a disagreement, conflict, or tension between the ICU and tele-ICU?
[**Probe for:** Who was involved (the roles of the parties)?, What was it about?, How was the disagreement or conflict communicated?, Did any parties get emotional?, How long did the conflict or tensions last?, Was it resolved?, How was it resolved – what was the process?, What was the outcome?, Were there any lasting positive or negative effects of the event?]
24. How does leadership influence the effectiveness of ICU telemedicine?
25. What changes do you think could be made to how telemedicine is provided? Utilized?
26. What would it be like if this ICU stopped using telemedicine tomorrow?
27. What are the legal/regulatory barriers to using telemedicine?
28. Are liability issues a barrier to using telemedicine?
 - a. If yes, how?

Patient and Family Involvement

29. When might telemedicine be involved with Palliative and/or End-of-Life considerations?
 - **If yes**, probe for circumstances when it is done.
 - **If yes**, probe for outcomes with pnt/FM and with other providers
 - **If not** involved, what do you see as the reasons telemedicine is not involved?
30. When would the tele-ICU interact with patients and families?
31. How is telemedicine perceived by patients and families?

Exploratory

32. How does telemedicine play a role in staff burn-out?

- If there is a role, in what ways can it help prolong careers?
- If there is a role, are there any ways it increases burn-out?
- If it doesn't currently play a role, how might you envision that it could play a role?

33. Do you have anything to add that you think is important for us to know?

Thank you for taking the time to talk with us and sharing your valuable insights.

If the tele-ICU is part of a broader range of telemedicine services, please ask how the different services are integrated (how do they work together)?

B.2 INTERVIEW SCRIPT – TELEMEDICINE UNIT

Introduction

The purpose of this interview is to learn your opinions regarding the use of telemedicine in intensive care. We are trying to identify the factors that make telemedicine effective in the ICU. We would also like your opinion about what barriers and facilitators may exist to telemedicine use. Your answers will be kept completely confidential; no one will be able to associate you with your answers or with your hospital. You will be identified by an ID number and profession and not by name.

Begin recording and make sure to state the **date, time, and participant ID number and profession.**

Background

1. How did you become interested in working with the tele-ICU service?

Starting to Use Telemedicine

2. What were the goals your organization hoped to achieve by using telemedicine in the ICU?

3. Has the adoption of telemedicine in achieved these goals?

→ If yes, how was telemedicine able to achieve these goals?

→ If no, what has prevented achieving these goals?

4. Were you here when [hospital ICU] first started using telemedicine?

→ If yes,

- a. How was telemedicine introduced to the ICU staff? (Was there training?)

→ Who did the introduction?

→ How was the training organized?

→ What was involved?

- b. How was telemedicine received by the ICU?

→ Has this changed over time?

→ If yes, what brought about the change?

→ If no,

- a. Did you hear stories about how telemedicine was received by the ICU? What did you hear?

5. When there are new hires in the Tele-ICU, how are they oriented to telemedicine?

- a. Has the orientation process changed over time?

→ If yes, how has it changed?

→ If yes, why did it change?

Structure and Process

6. What services does telemedicine provide for [hospital ICU]?
 - a. Do you assist in compliance with evidence-based practices? CMS quality measures?
→ If yes, walk me through how you assist (active, passive, routes)
7. What is the role of the tele-ICU in patient care?
 - a. Are there other ways you describe ICU telemedicine besides as a 'second set of eyes' or as 'backup'?
 - b. How is responsibility distributed between the ICU and the tele-ICU?
 - c. How is accountability distributed between the ICU and the tele-ICU?
8. Has telemedicine had an impact on patient outcomes? (probe for monitoring, emergencies, and evidence-based practices)
 - If yes, how has it had an impact on patient outcomes
 - If no, what have been the challenges?
9. For [Hospital/ICU], what are some challenges to noticing **early** patient deterioration or status changes? [**Probe for:** workload, unit layout, experience level, type of deterioration—RR, HR, BP, Pulse Ox, alarm fatigue]
10. For [Hospital/ICU], please describe any circumstances that contribute to a delay in noticing **late** signs of deterioration. [**Probe for:** workload, unit layout, experience level, type of deterioration—RR, HR, BP, Pulse Ox, alarm fatigue]
11. When does the tele-ICU help with patient alarms?
 - a. How does the tele-ICU help?
 - b. Are patient alarms in the ICU and tele-ICU set at the same thresholds?
12. What are challenges for the tele-ICU in noticing patient deterioration or status changes? [**Probe for:** role of alarm fatigue, responsibility]
13. How does telemedicine affect the workload or workflow of healthcare providers in the ICU?
14. How does the ICU respond to the clinical recommendations made by the tele-ICU? [probe for if and when recommendations are and are not acted upon]
15. Can you tell me a story of a time when telemedicine worked well? (explore what might of happened if telemedicine **was not** involved or available)
16. Can you tell me a story about a time when telemedicine didn't work well?
17. Have you ever met clinicians in the [hospital ICU] in-person?

→ If yes, in what circumstances have you met?
If yes, how does this affect how telemedicine is used?

18. How would you describe your relationship with [hospital ICU]?
19. How does the Tele-ICU assign coverage across the ICUs? [Are you routinely assigned to cover the same ICU?]
20. For the tele-ICU, what is the **key feature** that makes a difference in how well telemedicine works?
21. For the ICU, what is the **key feature** that makes a difference in how well telemedicine works?
22. Are there ever disagreements/conflicts/tensions with [hospital/ICU]?
 - If yes, we would like to know more about when this happens. Can you walk me through a specific example of a disagreement, conflict, or tension between [hospital/ICU] and tele-ICU?
 - [Probe for:** Who was involved (the roles of the parties)?, What was it about?, How was the disagreement or conflict communicated?, Did any parties get emotional?, How long did the conflict or tensions last?, Was it resolved?, How was it resolved – what was the process?, What was the outcome?, Were there any lasting positive or negative effects of the event?]
 - a. Are the conflicts/tensions with [hospital ICU] similar or different than with other ICUs?
23. How does leadership influence the effectiveness of ICU telemedicine?
24. What changes do you think could be made to how telemedicine is provided? Utilized?
25. Are there any unique features about how you work with [hospital ICU] that are different from the other ICUs you cover? (This may be related to services, relationships, roles, etc.)
26. What are the legal/regulatory barriers to using telemedicine?
27. Are liability issues a barrier to using telemedicine?
 - a. If yes, how?

Patient and Family Involvement

28. When might telemedicine be involved with Palliative and/or End-of-Life considerations?
 - **If yes**, probe for circumstances when it is done.
 - **If yes**, probe for outcomes with pnt/FM and with other providers
 - **If not** involved, what do you see as the reasons telemedicine is not involved?

29. When would the Tele-ICU interact with patients and families?

30. How is telemedicine perceived by patients and families?

Exploratory

31. How does telemedicine play a role in staff burn-out?

- If there is a role, in what ways can it help prolong careers?
- If there is a role, are there any ways it increases burn-out?
- If it doesn't currently play a role, how might you envision that it could play a role?

32. Do you have anything to add that you think is important for us to know?

Thank you for taking the time to talk with us and sharing your valuable insights.

If the tele-ICU is part of a broader range of telemedicine services, please ask how the different services are integrated (how do they work together)?

APPENDIX C: CONNECCT SURVEYS

C.1 CONNECCT PARTICIPANT DEMOGRAPHICS

Participant ID# _/_/_/_/_/_ [Site, Location, Researcher, Participant] Site: Site Number (ex. First Site is Site: 01) Location: Command Center (01); ICU1 (02); ICU2 (03) Researcher: Kim (01); Courtney (02); LauraEllen (03); PI/Col (04) Participant: KR: 1-25 | CK: 26-50 | LEA: 51-75 | PI/Col: 76-100

Q1. Type of Research Activity

- Interview (1)
- Focus Group (2)

Q2. What is your profession? Check all that apply.

- Physician (1)
- Intensivist (9)
- Fellow (What year) (11) _____
- Resident (What year) (10) _____
- Nurse (2)
- Administrator (3)
- Pharmacist (4)
- Respiratory Therapist (5)
- Social Worker (6)
- Nutritionist (7)
- HUC (12)
- Data Analyst (13)
- Other (please specify) (8) _____

Q3. Participant given background of researcher.

- Yes (1)
- No (2)

Q4. Where do you work?

- ICU Only (1)
- Command Center Only (2)
- ICU and Command Center (3)
- Other (please specify) (4) _____

Display This Question:

If Q2. What is your profession? Check all that apply. Physician (includes Residents and Fellows) Is Selected

Q2a. What is/are your professional specialty/specialties?

Q2b. What are your degree(s)?

Q2c. What are your certification(s)?

Display This Question:

If Where do you work? ICU Only Is Selected

Q4a. How long have you worked in the ICU? (Include time spent working in all ICUs, not just your current one.)

- Less than 3 years (1)
- 3 - 10 years (2)
- More than 10 years (3)

Q4b. Are you an ICU Director?

- Yes (1)
- No (2)

Q4c. Are you an eICU/Command Center Director?

- Yes (1)
- No (2)

Q4d. What is your typical work schedule? Check all that apply.

- Full Time (1)
- Part Time (2)
- Casual (3)
- Day Shift (4)
- Night Shift (5)
- Floating (6)

Display This Question:

If Where do you work? COR Only Is Selected

Q4e. How long had you worked in an ICU before you started working in the Command Center?

- Had not worked in an ICU (4)
- Less than 3 years (1)
- 3 - 10 years (2)
- More than 10 years (3)

Display This Question:

If How long have you worked in an ICU before working in the Command Center? Have not worked in an ICU Is Selected

Q4f. Where did you work before coming to the Command Center?

Display This Question:

If Where do you work? ICU and COR Is Selected

Q4g. How long have you worked in the ICU? (Include time spent working in all ICUs, not just your current one.)

- Less than 3 years (1)
- 3 - 10 years (2)
- More than 10 years (3)

Display This Question:

If Where do you work? COR Only Is Selected

Q4h. How long have you worked in the Command Center?

- Less than 3 years (1)
- 3 - 10 years (2)
- More than 10 years (3)

Display This Question:

If Where do you work? ICU and COR Is Selected

Q4i. How long have you worked in the Command Center?

- Less than 3 years (1)
- 3 - 10 years (2)
- More than 10 years (3)

Demographic Questions

Q5. What is your gender identification?

- Male (1)
- Female (2)
- Other (3)

Q6. What is your age? Please enter a numeric value only.

Q6. Age

- 18 and under (1)
- 19-24 (2)
- 25-34 (3)
- 35-44 (4)
- 45-54 (5)
- 55-64 (6)
- 65+ (7)

Q7. What is your race?

- White/Caucasian (1)
- Black/African American (2)
- Asian (3)
- Native American/Pacific Islander (4)
- Multiracial (5)
- Other (6) _____

Q8. What is your ethnicity?

- Hispanic/Latino(a) (1)
- Not Hispanic/Latino(a) (2)

Thank you!

C.2 CONNECCT PRE-VISIT ICU SURVEY

Q1. Is this hospital/ICU

- an ANCC Magnet Hospital (1)
- an AACN Beacon Award recipient (2)
- Other, please specify (3) _____

Display This Question:

If Is this hospital/ICU an ANCC Magnet Hospital Is Selected

Q1a. How long have you been a Magnet Hospital?

Q2 How many beds are in this ICU?

Q3 What is the average daily census of the ICU? (please specify by percentage of full beds)

Q4 How would you best describe your ICU in terms of the type of patients usually admitted here?

- Medical only (1)
- Surgical only (2)
- Mixed medical and surgical (3)
- Other (Please specify) (4) _____

Q5 The management/leadership team of the ICU includes: (Mark all that apply)

- Medical Director (1)
- Nurse Manager (another term would be Unit Director) (3)
- Educator (5)
- Other, please provide their title(s) (6) _____

Q6 How would you classify this ICU?

- Open (ICU service is led and managed by non-intensivists physician and may or may not include consultation with an intensivist) (1)
- Closed (ICU service led and managed by an intensivist) (2)
- Other, please describe (3) _____

Display This Question:

If How would you classify this ICU? Closed (ICU service led and managed by an intensivist) Is Not Selected

Q6a. What specialty/service typically admits and manages the ICU patients?

Display This Question:

If How would you classify this ICU? Open (ICU service is led and managed by non-intensivists physician and may or may not include consultation with an intensivist) Is Not Selected

Q6b. Weekday staffing for intensivists:

Number assigned to the ICU per shift (1)

Total number of hours in a shift (2)

Hours staffed by intensivist(s) in a 24 hour period (3)

Q7. Weekday staffing for nurses:
Average number in the ICU per shift (4)
Total number of hours in a shift (5)
Standard nurse to patient ratio: 1 to (6)

Q8. Are weekend staffing patterns different from weekdays?
 Yes (1)
 No (2)

Display This Question:
If Are weekend staffing patterns different from weekdays? Yes Is Selected
Q8a. What are the differences over the weekend?

Display This Question:
If How would you classify this ICU? Open (ICU service is led and managed by non-intensivists physician and may or may not include consultation with an intensivist) Is Selected

Q6c. In this ICU, how is the intensivist involved in patient care?
 Required to consult on all patients in the ICU (2)
 Requested to consult on patients in the ICU (3)
 No intensivist available for consultation (6)
 Other. Please specify: (5) _____

Q9. Which of the following providers are involved in bedside care during a typical weekday (NOTE: this question applies only to the "ICU team," not consultants or co-management teams.) Check all that apply:
 An intensivist physician (1)
 A non-intensivist physician (2)
 A resident, fellow, or other trainee (please indicate 1. the type of provider available, 2. the average number providing care in the ICU during a typical shift, and 3. how many hours in a 24 hour period this type of provider is available to the ICU-- e.g. residents-2 per shift, 24 hour coverage) (3)

 An advanced practice provider (i.e. a nurse practitioner or physician's assistant) (4)

Q10. Which of the following providers are involved in bedside care during a typical weekend (NOTE: this question applies only to the "ICU team," not consultants or co-management teams.) Check all that apply:
 An intensivist physician (1)
 A non-intensivist physician (2)
 A resident, fellow, or other trainee (please indicate 1. the type of provider available, 2. the average number providing care in the ICU during a typical shift, and 3. how many hours in a 24 hour period this type of provider is available to the ICU-- e.g. residents-2 per shift, 24 hour coverage) (3)

 An advanced practice provider (i.e. a nurse practitioner or physician's assistant) (4)

Q11. Besides physicians and nurses, which clinicians also routinely provide direct patient care in your ICU?
Check all that apply and indicate how many are assigned on a typical weekday.

- Respiratory therapists (1) _____
- Clinical Pharmacists (2) _____
- Nutritionists (3) _____
- Social Workers (4) _____
- Physical Therapists (5) _____
- Other, please specify (6) _____
- None of the above (7)

Q12. During the week, how often do medical rounds take place?

- Twice a day (8)
- Once a day (1)
- Weekly (3)
- Other, please describe: (5) _____
- Never (7)

Display This Question:

If During the week, how often do medical rounds take place? Never Is Not Selected

Q12a. Are all patients reviewed during medical rounds?

- Yes (4)
- Not always (5)
- No (6)

Display This Question:

If Interdisciplinary rounds, frequency Never Is Not Selected

Q12b. What time do rounds take place?

Display This Question:

If During the week, how often do medical rounds take place? Never Is Not Selected

Q12c. Which of the following care providers consistently participate in these rounds? Check all that apply:

- Intensivist (9)
- Other physician, please specify specialty/service. (10) _____
- Resident, fellow, or other trainee (11)
- Bedside nurse (12)
- Charge nurse (13)
- Respiratory therapists (1)
- Clinical Pharmacists (2)
- Nutritionists (3)
- Social Workers (4)
- Physical Therapists (5)
- Physician Assistants/ Nurse Practitioners (6)
- Other, please specify (7) _____
- None of the above (8)

Display This Question:

If During the week, how often do medical rounds take place? Twice a day Is Selected

Q12d. Is there a difference in the professionals present during the first daily rounds compared to the second?

- Yes (1)
- No (2)

Display This Question:

If Is there a difference in the professionals present during the first daily rounds compared to the second? Yes Is Selected

Q12e. Which of the following care providers consistently participate in the second rounds of the day? Check all that apply:

- Intensivist (9)
- Other physician, please specify specialty/service. (10) _____
- Resident, fellow, or other trainee (11)
- Bedside nurse (12)
- Charge nurse (13)
- Respiratory therapists (1)
- Clinical Pharmacists (2)
- Nutritionists (3)
- Social Workers (4)
- Physical Therapists (5)
- Physician Assistants/ Nurse Practitioners (6)
- Other, please specify (7) _____
- None of the above (8)

Q13. Is your medical rounding structure the same for weekends as for weekdays?

- Yes (1)
- No. Please describe how it is different. (2) _____

Q14. What type of medical providers, with prescribing authority, are available to respond to medical concerns at the patient's bedside during off-hours? Mark all that apply.

- In-house intensivist (1)
- Non-Intensivist Physician (2)
- Residents (4)
- Fellows (3)
- MD in the telemedicine command center (8)
- Advanced Practice Provider (5)
- Other, please specify (6) _____
- None of the above (7)

Q15. Does anyone in this ICU also work in the telemedicine command center?

- Yes (1)
- No (2)

Display This Question:

If Does anyone in your ICU also work in the telemedicine command center? Yes Is Selected

Q15a. Which professions also work in the telemedicine command center? Check all that apply and indicate how many from the ICU also work in the telemedicine command center.

- Intensivist (1) _____
- Nurse (2) _____
- Non-intensivist physician (3) _____
- Advance practice provider (4) _____
- Other (5) _____

Q16. Does the telemedicine command center provide 24 hour coverage to this ICU?

- Yes (1)
- No (2)

Display This Question:

If Does the Telemedicine command center provide 24 hour coverage? No Is Selected

Q16a. What hours are covered by telemedicine?

Q17. In addition to monitoring, what services does telemedicine provide for the ICU? (select all services provided)

- Rounding on patients (1)
- Quality improvement initiatives (2)
- Goal review (3)
- Education (4)
- Episodic response, please describe (5) _____
- Other, please describe (6) _____

Display This Question:

If In addition to monitoring, what services does telemedicine provide for the ICU? (select all services provided) Rounding on patients Is Selected

Q17a. How does the command center conduct rounds?

Q18. Describe the protocols for when and how the command center and ICU communicate

Q19. What is the sign-out procedure from bedside providers to command center staff?

- All patients are signed-out (1)
- Some providers and services sign-out patients. Which providers and services typically sign-out patients? (2) _____
- No sign-out (4)

Q20. How much access does the command center have to patients' electronic health records?

- The command center has access to all electronic health records. (1)
- The command center has access to some clinicians' electronic health records. Please specify which clinicians and the electronic records system(s) you have access to. (2) _____
- The command center does not have access to any electronic health records. (4)

Q21. The next questions ask about the use of clinical protocols and checklists. By "protocol," we mean a written clinical pathway that provides a standardized algorithm for caring for patients with a given condition.

Q22. This ICU has an established protocol for: (please indicate all that apply)

- Liberation from mechanical ventilation (i.e. respiratory therapist-driven trials of spontaneous breathing) (1)
- Low tidal volume ventilation strategy for patients with acute respiratory distress syndrome (i.e. lung protective ventilation) (2)
- Management of sedation for patients on mechanical ventilation (3)
- Daily interruption of continuous sedation (i.e. a "sedation holiday" or "sedation vacation") (4)
- Targeted temperature management (a.k.a. "therapeutic hypothermia") after cardiac arrest (5)

Q23. Does your ICU use a standardized checklist prior to inserting a central venous catheter in order to prevent blood stream infections?

- Yes (1)
- No (2)

Q24. Does your ICU use a standardized checklist on rounds to ensure that key evidence-practices are regularly discussed?

- Yes (1)
- No (2)

Q25. Does your ICU perform regular delirium screening using a standardized measurement instruments such as the cAM-ICU?

- Yes (1)
- No (2)

Q26. Does the telemedicine command center assist the ICU in monitoring protocols and use of checklists?

- Yes (1)
- No (2)

Display This Question:

If Does the telemedicine command center assist the ICU in monitoring protocols and use of checklists? Yes Is Selected

Q26a.. How does the command center assist in monitoring protocols and use of checklists?

Q27 Please provide any feedback on how to improve this survey.

Q28 Please write in the name of this hospital:

C.3 CONNECCT PRE-VISIT TELEMEDICINE UNIT SURVEY

Please note, when the survey refers to "specified" ICU it means the ICU listed in the email that contained the link to this survey.

Q1. Please write in the name of the "specified" hospital ICU that this survey will be asking you about

Q2. Does the command center provide 24 hour services?

- Yes (1)
- No (2)

Display This Question:

If Does the command center provide 24 hour coverage? No Is Selected

Q2a. What hours are telemedicine services offered?

Q3. Command center staffing during the week:

- Number of intensivists per shift (1)
- Hours per shift for intensivists (2)
- Hours staffed by intensivists in a 24 hour period (3)
- Number of nurses per shift (4)
- Hours per shift for RNs (5)
- Hours staffed by RNs in a 24 hour period (6)
- Standard doctor to patient ratio: 1 to (7)
- Standard RN to patient ratio: 1 to (8)
- Other professions routinely available and the hours they are available (9)

Q4. Do weekends have a different staffing pattern from weekdays?

- Yes (1)
- No (2)

Display This Question:

If Do weekends have a different staffing pattern from weekdays? Yes Is Selected

Q4a. Command center staffing over the weekend:

- Number of intensivists per shift (1)
- Hours per shift for intensivists (2)
- Hours staffed by intensivists in a 24 hour period (3)
- Number of nurses per shift (4)
- Hours per shift for RNs (5)
- Hours staffed by RNs in a 24 hour period (6)
- Standard doctor to patient ratio: 1 to (7)
- Standard RN to patient ratio: 1 to (8)
- Other professions routinely available and the hours they are available (9)

Q5. The management/leadership team of the command center includes: (Mark all that apply)

- Medical Director (1)
- Nurse Director/Manager (3)
- Operations Manager (5)
- Other, please provide their title(s) (7) _____

Q6. Have you ever had technological difficulties with the telemedicine system?

- Yes (1)
- No (8)

Display This Question:

If Have you ever had technological difficulties with the telemedicine system? Yes Is Selected

Q6a. Who is available to address the problem?

Display This Question:

If Have you ever had technological difficulties with the telemedicine system? Yes Is Selected

Q6b. Typically, how fast were the problems resolved?

- Within 10 minutes (1)
- Between 11 and 30 minutes (2)
- Between 31 and 60 minutes (3)
- Over an hour (4)

Q7. How many hospitals are supported by this command center?

Q8. How many total ICUs are covered by this command center?

Q9. How many total ICU beds are covered by this command center?

Q13 Compared to when you first started providing telemedicine services, the total number of beds covered has:

- Remained stable (1)
- Increased (2)
- Decreased (3)

Display This Question:

If Compared to when you first started providing telemedicine services, the total number of beds covered has: Remained stable Is Not Selected

Q13a. Describe reasons for the change in total number of beds covered?

Q14. For the specified ICU, how are the command center services paid for?

- Insurance (1)
- Funded within same parent organization (2)
- Contract (3)
- Grant/Foundation (4)
- Other, please describe (5) _____

Q15. How is command center staff performance evaluated?

Q16. How is the telemedicine system performance evaluated?

Q17. How are staff recruited to work in the command center?

Q18. From where are command center staff typically recruited?

Q19. When there is a shift change in the command center, how are patients reviewed? Check all that apply:

- All cases are reviewed (1)
- All unstable cases are reviewed (2)
- All new patients are reviewed (4)
- No patient review (5)
- Other, please specify (3) _____

Display This Question:

If How are patients reviewed between outgoing and oncoming command center clinical staff? Check all that apply: Not routinely performed Is Not Selected

Q19a. At what time(s) of day are cases reviewed?

Display This Question:

If How are patients reviewed between outgoing and oncoming command center clinical staff? Not routinely performed Is Not Selected

Q19b. Who participates in these reviews?

Display This Question:

If How are patients reviewed between outgoing and oncoming command center clinical staff? Check all that apply: Not routinely performed Is Not Selected

Q19c Please describe how the reviews are conducted?

Q20. For the specified ICU what services (responsibilities/roles) have been agreed upon for telemedicine? (select all services provided)

- 24 hour monitoring (1)
- Part-time monitoring. If part-time, please indicate when the ICU is covered by telemedicine (times of day covered and any variation over the weekends) (2) _____
- Rounding on patients (3)
- Quality improvement initiatives (4)
- Goal review (5)
- Education (6)
- Episodic response, please describe (7) _____
- Other, please describe (8) _____

Q21. What type of medical providers, with prescribing authority, are available to respond to medical concerns at the patient's bedside during off-hours? Mark all that apply.

- In-house intensivists (1)
- Non-intensivist Physician (2)
- Residents (3)
- Fellows (4)
- MD in the telemedicine command center (9)
- Advanced Practice Provider (5)
- Other (7) _____
- None of the above (6)

Q22. What is the percentage of command center physicians who also work at the specified ICU?

- 76%-100% (1)
- 51%-75% (2)
- 26%-50% (3)
- 1%-25% (4)
- 0% (5)

Q23. What is the percentage of command center nurses who also work at the specified ICU?

- 76%-100% (1)
- 51%-75% (2)
- 26%-50% (3)
- 1%-25% (4)
- 0% (5)

Q24. Describe communication protocols between the specified ICU and the command center

Q25. What is the sign-out procedure from the specified ICU bedside providers to command center staff?

- All patients are signed-out (1)
- Some providers and services sign-out patients. Which providers and services typically sign patients out? (2) _____
- No sign-out (4)

Q26. How much access does the command center have to patients' electronic health records?

- The command center has access to all electronic health records. (1)
- The command center has access to some clinicians' electronic health records. Please specify which clinicians and the electronic records system(s) you have access to. (2) _____
- The command center does not have access to any electronic health records. (4)

Display This Question:

If For the specified ICU, what bedside documentation is available to the command center team?
Electronic documentation is in a system that is not visible to the command center team Is Selected

Q26a. How does the command center access needed documentation?

Q27. Please give us any feedback on how to improve this survey.

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