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**Nursing Year in Review Bibliography
Sunday, May 21**

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SYMPTOM SCIENCE IN THE ICU SETTING: IMPLICATIONS FOR FUTURE RESEARCH

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IMPACT OF PROLONGED MECHANICAL VENTILATION ON DISABILITY AND RECOVERY

Herridge MS, Chu L, Matte A, Tomlinson G, Chan L, et al. RECOVER Program Investigators; Canadian Critical Care Trials Group. **The RECOVER Program: Disability risk groups and 1-year outcome after 7 or more days of mechanical ventilation.** *Am J Resp Crit Care Med* 2016; 831-844

Summary

A multi-center cohort composed of Canadian medical and surgical ICU patients (n = 391) who had experienced 7 or more days of mechanical ventilatory support were stratified into disability risk profiles describing 1-year recovery trajectories of function, exercise capacity, muscle strength, health-related quality of life, neuropsychological outcomes (impact of events, depression) and healthcare utilization. ICU data included patient demographics, severity of illness (APACHE II) and daily Multiple Organ Dysfunction Score (MODS) days 0 to 7; MODS was also obtained twice/week for the entire ICU stay. Outcomes were measured at 7 days and at 3, 6, 12 months post-ICU discharge. Four disability risk groups were identified based on age (young, older, oldest), ICU length of stay (short, long) and functional dependency measured with the Functional Independence Measure (FIM) 7 days post-ICU discharge. Results indicate heterogeneous trajectories of recovery and disability in this diverse cohort of patients. Symptoms of depression and post-traumatic stress disorder persisted at one year in 17% and 18% of patients respectively. Patients < 42 years of age with ICU stays < 2 weeks had the best outcomes. Patients > 66 years of age with ICU stays > 2 weeks had the worst disability and higher mortality rates. The 7-day post-ICU Functional Independence Measure (FIM) independently informs various recovery trajectories regardless of illness severity or ICU admission diagnosis.

Comments

1. Functional Independence Measure (FIM) at 7 days post-ICU discharge is an independent risk factor for mortality and may be useful in future ICU recovery studies.
2. The four identified disability groups describe increasing risk for disability, healthcare utilization, and poorer outcomes.
3. Individually tailored interventions are needed that address changing patient needs over the recovery trajectories as a "one size fits all" approach may not be impactful.
4. Individually tailored symptom management interventions are needed to account for changing patient needs both during an

ICU stay and during the post-ICU recovery period which can be lengthy.

5. Large sample sizes that carefully measure key outcomes for one year or more after critical illness are needed to advance symptom science for our most vulnerable patients.

PATIENTS' RECOLLECTIONS OF ICU PROCEDURE-INDUCED PAIN INTENSITY AND DISTRESS

Puntillo KA, Max A, Chaize M, Chanques G, Azoulay E. **Patient recollection of ICU procedural pain and post ICU burden: The Memory Study.** *Crit Care Med* 2016; 44: 1988-95

Summary

Patients (n = 236) who had received care in 34 Belgian and French ICUs were asked to recall the intensity and distress of pain experienced during procedures (positioning, line insertions, ET suctioning, tube removal, etc.) while hospitalized. Participants were queried via telephone 3-16 (median 9) months after discharge on pain recall, current pain and for traumatic stress [Impact of Events Scale (IES)]. A majority of the participants recalled being in the ICU (77%) but fewer remembered the procedures (36%). A small number specifically recalled procedure-related pain intensity (24%) as well as procedure-related distress (18%). Recalled procedure-related pain intensity and distress scores were higher than those documented during ICU stay. Surprisingly, there was no difference between recalled medical ICU and surgical ICU procedure-related pain intensity or distress. Current pain that was not present at the time of ICU admission was reported by 14% of the participants. A small percentage (10%) of participants had IES scores indicative of PTSD. Participants who identified "new" current pain recalled significantly higher ICU procedure-related pain intensity and distress.

Comments

1. Patients do remember being in the ICU.
2. Patients may not remember specific pain-producing procedures after discharge from the hospital.
3. It is crucial that pain experiences be assessed for both intensity (level of sensation) and distress (affective unpleasantness of the pain sensation).
4. Pain continues to be a commonly experienced symptom among ICU patients that requires appropriate management.

VALIDITY OF THE CRITICAL CARE PAIN OBSERVATION TOOL IN THE PRESENCE OF DELIRIUM

Kanji S, MacPhee H, Singh A, Johanson C, Fairbairn J, et al. **Validation of the Critical Care Pain Observation Tool in critically ill patients with delirium: A prospective cohort study.** *Crit Care Med* 2016; 44: 943-947

Summary

The goal of this prospective cohort study conducted in two Canadian ICUs was to validate the Critical Care Pain Observation Tool (CPOT) in a sample of 40 adult patients screened as delirium present using the Confusion Assessment Method-ICU (CAM-ICU). Pain assessments were conducted using the CPOT by members of the research team and independently by ICU nurses at baseline, after non-painful stimuli, and after painful stimuli (repositioning, dressing change, endotracheal tube suctioning) over a time period of approximately 21 minutes. A majority of the patients were receiving mechanical ventilatory support (90%). The CPOT discriminated pain between baseline and painful stimulus, but not with non-painful stimuli. Reliability was good with an internal consistency Cronbach alpha = 0.778 and inter-rater agreement kappa = 0.669; $r = 0.957$. Agreement between the nurses' subjective opinion and the CPOT was 80.5% during painful stimuli.

Comments

1. The Critical Care Pain Observation Tool is valid and reliable in the presence of acute brain dysfunction (delirium) and painful stimuli.
2. The Critical Care Pain Observation Tool (CPOT) can be used to guide pain management interventions in ICU patients with delirium present.
3. Future studies are needed to determine the validity and reliability of the CPOT in sedated patients.

SLEEP ENHANCING INTERVENTIONS' IMPACT ON DELIRIUM

Flannery AH, Oyler DO, Weinhouse GL. **The impact of interventions to improve sleep on delirium in the ICU: A systematic review and research framework.** *Crit Care Med* 2016; 44: 2231-40.

Summary

Studies published in 10 manuscripts (1,639 total enrolled patients) were critically evaluated to determine the impact of any sleep-enhancing interventions (pharmacological, non-pharmacological) on the occurrence of delirium, duration of delirium, and length of ICU stay. Four studies tested multiple interventions; three tested pharmacological agents; one tested ear plugs only; and two tested bright light to optimize circadian rhythm. A majority were RCTs (60%) with moderate methodological quality limited by a lack of blinding and selection bias. A majority of the studies (60%) reported a reduction in the occurrence of ICU delirium and a small number ($n = 3$) reported reduced duration of delirium. Only two studies reported a significant reduction

in length of ICU stay. The authors concluded that the evidence on sleep-enhancing interventions to reduce the occurrence of delirium is plagued by heterogeneous patient populations and confounding of results due to multiple simultaneous interventions. Four recommendations were provided for a more systematic approach to ICU sleep enhancing interventions to realize higher quality studies that add to the evidence base, along with the need for a scientifically sound research framework.

Comments

1. Acute brain dysfunction, or delirium, is a multi-faceted syndrome with numerous risk factors that require consideration in any intervention study.
2. The association between poor sleep while in the ICU and delirium is not well established, resulting in challenges in developing and testing scientifically-based interventions.
3. Additional descriptive work is needed to develop strong scientific underpinnings to guide research efforts to illuminate the complex, dynamic relationships among poor ICU sleep, sleep enhancing interventions, and the occurrence of acute brain dysfunction.

IMPLEMENTATION SCIENCE

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IMPLEMENTATION SCIENCE: THE ATS OFFICIAL STATEMENT

Weiss CH, Krishnan JA, Au DH, Bender BG, Carson SS, Cattamanchi A, Cloutier MM, Cooke CR, Erickson K, George M, Gerald JK, Gerald LB, Goss GH, Gould MK, Hyzy R, Kahn JM, Mittman BS, Moseson EM, Mularski RA, Parthasarathy S, Patel SR, Rand CS, Redeker NS, Reiss TF, Riekert KA, Rubenfeld GD, Tate JA, Wilson KC, Thomson CC and ATS Ad Hoc Committee on Implementation Science. **An Official American Thoracic Society Research statement: Implementation Science in Pulmonary, Critical Care and Sleep Medicine.** *American Journal of Respiratory and Critical Care Medicine*, 2016 15: 194(8): 1015-1025.

Summary

This paper summarizes the American Thoracic Society's Official Research Statement on Implementation Science in Pulmonary, Critical Care and Sleep Medicine. This statement was developed through a multidisciplinary ad hoc committee that used an iterative consensus process. This research statement defines implementation science as "the study of mechanisms by which health care interventions are adopted or not adopted in clinical or community settings". An important caveat is that implementation science is a robust theory-reliant field that uses theory to guide the evaluation of adoption (or de-adoption) of particular health care practices to uncover reasons for why particularly adoption succeeds or fails in various settings. In addition, multiple implementation frameworks are presented that could be used for implementation research in pulmonary, critical care and/or sleep medicine. Various opportunities for professional societies such as ATS to stimulate implementation science research among their members are also highlighted. The committee concluded that implementation science should involve early and continued stakeholder involvement along with the use of implementation science frameworks aligned with the specific research question and setting. The committee identified a range of potential mechanisms through which ATS or other like organizations could promote implementation science such as supporting implementation science studies through funding, collaborating with research funders to assist in agenda-setting for implementation science and creating opportunities for front-line clinicians to have access to implementation scientists.

Comments

1. This is the first consensus statement on implementation science relevant to pulmonary, critical care or sleep medicine.
2. This paper underscores the importance of using implementation theory to conduct implementation studies and provides key

examples relevant to pulmonary, critical care and sleep medicine along with the potential theory and/or framework.

3. Importantly, a clear distinction is made between implementation science – theory-reliant field of how to adopt or not adopt health care interventions with an emphasis on understanding why adoption succeeds or fails – vs. implementation – defined as a the systematic method to adopt certain practices.

IMPLEMENTATION SCIENCE: NURSING

Bahr SJ, Siclovan DM, Oppen K, Beiler J, Bobay KL, Weiss ME. **Interprofessional health team communication about hospital discharge: An implementation science evaluation study.** *Journal of Nursing Care Quality*. 2016 Epub, ahead of print.

Summary

This study was a formative evaluation of an implementation of a redesigned interprofessional team rounding process in one Magnet-status, academic medical center in the Midwest. The Consolidated Framework for Implementation Research (CFIR) guided this evaluation. The redesigned rounding process involved daily team rounding at the bedside as well as bedside nurse shift report with the use of whiteboards and rounding checklists to facilitate ongoing communication. Qualitative methods, specifically interviews, focus groups and observations, were used to evaluate the implementation process of a redesigned rounding process for medical/surgical patients cared for in 2 surgical units in one hospital. Despite positive views of the importance and benefits of the redesigned rounding process, patients, nurses and providers (attending physicians, residents and nurse practitioners) expressed differing perspectives on the rounding process. However, all agreed that workflow challenges, team hierarchy and unit culture led to intermittent implementation and limited sustainability of the practice.

Comments

- 1 This study highlights the benefits of a concurrent implementation evaluation of an intervention study; particularly a formative evaluation approach of which the goal is to provide insight to explain the success or failure of the redesigned rounding process.
2. Sustainability of the redesigned rounding process was difficult to maintain due to workflow, contextual and cultural issues in the setting.
3. The Consolidated Framework for Implementation Science Research (CFIR) was used to guide this formative evaluation however, use of the CFIR to elicit barriers and facilitators to the proposed intervention prior to implementation may help to improve sustainability in future studies.

IMPLEMENTATION SCIENCE: PULMONARY

Duffy SA, Ronis DL, Ewing LA, Waltje AH, Hall SV, Thomas PL, Olree CM, Maguire KA, Friedman L, Klotz S, Jordan N, Landstrom GL. **Implementation of the Tobacco Tactics intervention versus usual care in Trinity Health community hospitals.** *Implementation Science*, 2016 11: 147.

Summary

The purpose of this study was to describe the results of an implementation of nurse-administered Tobacco Tactics interventions in 3 community hospitals compared to 2 hospitals with usual care using the RE-AIM implementation framework. Tobacco Tactics is an effective nurse-administered and web supported intervention, packaged as a user-friendly toolkit, to facilitate smoking cessation for hospitalized adult patients. Mixed methods, using surveys and interviews, were used to report on the: 1) Reach of the implementation intervention (i.e. reported as patient participation rates); 2) Adoption of the intervention (i.e. nurse participation rates); 3) Implementation of the intervention (i.e. changes in nurses' attitudes towards providing smoking cessation pre-post implementation) and 4) Maintenance of the intervention (i.e. short-term sustainability of the intervention). There were relatively high patient participation rates (71.5%) and high nurse participation rates in the intervention training (76%) suggesting effective reach and adoption of the intervention. Nurses reported increases in implementation of providing smoking cessation materials to patients, suggesting an increase in implementation according to the RE-AIM framework. Lastly, maintenance of the intervention was reported for 1 year after researchers completed the study.

Comments

1. While this study relied on predominately nurse-reports to assess implementation outcomes which may be prone to bias, it suggests effective reach, adoption, implementation and maintenance of the Tobacco Tactics intervention compared to usual care.
2. The authors conclude that effective adoption and implementation was likely due to the use of a user-friendly toolkit for implementation.
3. Not only does this study demonstrate success in its implementation efforts, it also highlights the important role that nurses can play in improving smoking cessation for inpatient smokers, to optimize patient and population health

IMPLEMENTATION SCIENCE: CRITICAL CARE

Tarrant C, O'Donnell B, Martin G, Bion J, Hunter A, Rooney KD. **A complex endeavor: an ethnographic study of the implementation of the Sepsis Six clinical care bundle.** *Implementation Science*, 2016; 11: 149.

Summary

The purpose of this international ethnographic study was to examine frontline clinician implementation of the Sepsis Six care bundle, ideally within one hour of recognition of sepsis, in 6 hospitals in the Scottish Patient Safety Programme Sepsis collaborative. The study aimed to explore barriers and

facilitators to reliable implementation of the Sepsis Six care bundle. Non-participant observation and interviews with clinicians were used to identify the barriers and facilitators in multiple units across the 6 hospitals. Through over 300 hours of non-participant observation and interviews, they identified a range of implementation strategies that promoted reliable implementation. These implementation strategies included education, staff motivation as well as ensuring that appropriate equipment was available and ready-to-use. Despite these facilitators, implementation of the Sepsis Six care bundle within one hour of sepsis recognition remained difficult and involved multiple steps that were not straightforward and required coordination. In addition, operational and contextual issues affected the frontline clinicians' ability to deliver the Sepsis Six care bundle in the recommended 1-hour time interval. The results point to a need for implementation efforts to target individual clinician behavior, address the complexity and workflow coordination needed and acknowledge the operational and contextual issues that affect implementation.

Comments

1. This article was a well-done qualitative study of barriers and facilitators to implementation of a complex care bundle in 6 hospitals.
2. Through observation, the authors catalogued the multiple steps necessary to complete the Sepsis Six care bundle, highlighting the complexity of care delivery, especially guideline-based care delivery.
3. While the study sites were able to effectively improve awareness of sepsis and had targeted individual behavior change strategies to enhance implementation, there were still routine system issues that prevented reliable implementation of the Sepsis Six within the one-hour recommended time interval.
4. This study highlights the need for a multi-faceted and multi-level implementation plan when designing healthcare implementation studies of complex interventions.

IMPLEMENTATION SCIENCE: SLEEP

Parthasarathy S, Carskadon MA, Jean-Louis G, Owens J, Bramoweth A, Combs D, Hale L, Harrison E, Hart CN, Hasler BP, Honaker SM, Hertenstein E, Kuna S, Kushida C, Levenson JC, Murray C, Pack AI, Pillai V, Puijsma K, Seixas A, Strollo P, Thosar SS, Williams N, Buysse D. **Implementation of Sleep and Circadian Science: Recommendations from the Sleep Research Society and National Institutes of Health Workshop.** *Sleep*, 2016 epub ahead of print.

Summary

This white paper summarizes recommendations from the Sleep Research Society and a National Institutes of Health workshop about implementation science in sleep and circadian science. The recommendations describe particular implementation gaps as it relates to sleep and circadian science, a range of implementation strategies as well as itemization of opportunities to enhance translation of evidence into practice in sleep and circadian science.

They prioritized 3 specific areas for discussion – 1) insomnia; 2) sleep-disordered breathing; and 3) adolescent sleep health. For each area, they report current evidence-based interventions that are ready for implementation, list high priority research needs and itemize potential implementation strategies. For example, high-priority future research needs for insomnia include dissemination of simple screening tools for insomnia so that they can be incorporated into routine practice..

Comments

1. This is the second paper this year, reporting on results from a similar professional society's work on implementation science research – emphasizing the importance of implementation science to the field.
2. This paper includes a well done figure that explains differences between T1, T2 and T3 translation to orient the readers.
3. Researchers and clinicians alike can find helpful hints and a potential roadmap for future implementation science research as it relates to sleep and circadian science.

END OF LIFE COMMUNICATION IN THE ICU

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MODELS FOR DELIVERY OF COMMUNICATION SUPPORT

Curtis JR, Treece PD, Nielsen EL, Gold J, Ciechanowski PS, Shannon SE, Khandelwal N, Young JP, Engelberg RA. **Randomized trial of communication facilitators to reduce family distress and intensity of end-of-life care.** *Am J Respir Crit Care*, 2016; 193: 154-62

Summary

Family members of critically-ill ICU patients experience high levels of psychological distress, and patients frequently receive high-intensity care at end of life (EOL). Some interventions to improve communication have yielded improvements in family outcomes, while others have demonstrated lower intensity of care at EOL. This parallel-group randomized trial tested the impact of an intervention, which used a trained nurse or social worker as a facilitator, on measures of family distress and intensity of EOL care in the ICU setting. The role of the facilitator was to improve communication between ICU staff and patients' family members and provide emotional support to families. The study enrolled 268 family members of 168 eligible patients and randomized them to the intervention or usual care. Data using validated measures of depression, anxiety and PTSD were collected from family members at baseline, 3- and 6-months post ICU, along with data on ICU length of stay (LOS) and costs. Results showed significantly lower scores on measures of depression at 6 months for the intervention group. However, no differences on measures of depression at 3 months or anxiety and PTSD at 3 and 6 months were observed. There was significantly lower LOS and costs for non-survivors in the intervention group..

Comments

1. This trial offers further evidence that improved clinician-family communication is associated with decreased intensity of care without increased mortality, suggesting that better communication facilitates earlier transition to withdrawal of life-sustaining treatment at end of life.
2. Using a model of communication support involving trained facilitator/navigators, this trial was the first to demonstrate a simultaneous decrease in intensity of end of life care with same or improved distress among family members.
3. Results of this trial suggest that integration with the ICU team may be an important component of interventions to improve clinician-family communication in the ICU setting, and further testing of this hypothesis is needed.

4. Facilitators had a mean of 9.4 contacts with family members and provided an average of 267 total minutes of contact per family; however, support was provided across the ICU stay.
5. Difficulty with enrollment and loss to follow-up were major challenges in this study, and a larger trial is warranted to test the effect of this model of communication support on patient and family-centered outcomes.

MODELS FOR DELIVERY OF COMMUNICATION SUPPORT

Carson SS, Cox CE, Wallenstein S, Hanson LC, Danis M, Tulskey JA, Chai E, Nelson JE. **Effect of palliative care-led meetings for families of patients with chronic critical illness: A randomized clinical trial.** *JAMA* 2016; 316: 51-62

Summary

Almost all ICU patients with chronic critical illness require institutional care after hospital discharge, and their one-year survival rate is between 32% and 55%. This multisite randomized trial tested the impact of a communication intervention using palliative care specialists on measures of anxiety, depression, PTSD, and satisfaction among decisional surrogates of ICU patients with chronic critical illness. Decisional surrogates (N=365) of eligible ICU patients (N= 256) with prolonged mechanical ventilation (MV) were enrolled and assigned to the intervention or control group using stratified block randomization. The intervention involved surrogates' receipt of a brochure about chronic critical illness and at least 2 structured meetings (on days 7 and 17 of MV) with palliative care specialists where prognosis, patient preferences, and goals of care were discussed. Surrogates in the control group received the brochure and usual care. Study staff blinded to group assignment collected data on measures of anxiety, depression, PTSD and satisfaction via telephone interview at 90 days. Analysis showed no difference between intervention and control subjects on measures of anxiety and depression at 90 days, and those in intervention group had significantly higher PTSD scores at 90 days. In addition, there were no differences in family satisfaction between groups.

Comments

1. Many interpretations for the results of this study center around the low levels of coordination between the interventionists and the ICU team in this model of communication support. (See editorial, White DB. Strategies to support surrogate decision makers of

patients with chronic critical illness: The search continues. *JAMA* 2016;316:35-7.)

2. Studies have demonstrated that many family members of critically-ill ICU patients show symptoms of depression, anxiety and traumatic stress by day 4 of the ICU stay; however, in this intervention, families did not meet with the interventionists until at least 7 days after ICU admission.
3. This well-designed trial had excellent enrollment, low attrition, and the protocolization of the sessions permitted a detailed assessment of intervention fidelity, which was well maintained.
4. While it is resource intensive, in-person data collection may decrease loss to follow-up.

IMPROVING COMMUNICATION: CHALLENGES AND OPPORTUNITIES

Anderson WG, Puntillo K, Boyle D, Barbour S, Turner K, Cimino J, Moore E, Noort J, MacMillan J, Pearson D, Grywalsky M, Liao S, Ferrell B, Meyer J, O'Neil-Page E, Cain J, Herman H, Mitchell W, Pantilat S. **ICU bedside nurses' involvement in palliative care communication: A multicenter survey.** *J Pain Symptom Manage* 2016; 51: 589-96

Summary

Of all ICU clinicians, bedside nurses have perhaps the greatest levels of contact and continuity with patients' families. Hence, nurses are well-positioned to facilitate improved communication with ICU patients' families. This survey was conducted in preparation for the development of a system-wide initiative to integrate palliative care into ICU care. The goal of the survey was to assess nurses' level of knowledge about palliative care communication; participation in palliative care communication activities; confidence in their ability to perform palliative care communication tasks; and barriers to participation in palliative care discussions. The survey was sent electronically to 1791 nurses in 26 diverse California ICUs and had a 33% response rate. Nurses strongly endorsed the importance of discussions between clinicians and family members around prognosis and goals of care and the importance of nurse participation in those discussions. However, few nurses reported high levels of confidence in their ability to participate in discussions about goals of care. Furthermore, few nurses reported routinely attending or participating at family meetings. Interestingly, time was not cited as a major barrier to greater participation in palliative care communication, but lack of communication skills and concern about emotional distress were cited as barriers.

Comments

1. Results of this survey indicate that while nurses value participation in discussions about prognosis and goals of care with physicians and family members, they lack formal opportunities to routinely participate in those discussions.

2. Interventions to ensure nurses' attendance and promote their participation at interdisciplinary family meetings represent a good mechanism for integrating nurses into palliative care communication.
3. Nurses expressed concern for emotional distress and burnout as a result of greater involvement in palliative care communication, indicating a need for mechanisms to augment self-care.
4. Nurses believe they need additional communication training.

Ramos KJ, Downey L, Nielsen EL, Treece PD, Shannon JE, Curtis JR, Engelberg RA. **Using nurse ratings of physician communication in the ICU to identify potential targets for interventions to improve end-of-life care in the ICU.** *J Palliat Med* 2016; 19: 292-99.6

Summary

While evidence suggests good clinician-family communication improves the quality of care at end of life (EOL), it has been difficult to identify discrete, actionable elements of communication on which to intervene. This innovative study addresses the problem of ceiling effects seen in family ratings of EOL care by tapping into the perspectives of ICU nurses. The investigators performed a secondary analysis of data on nurse-assessed quality of dying and quality of communication in 1173 ICU deaths, which was collected for a large multicenter trial testing a palliative care integration intervention. The investigators used path analysis to identify associations between characteristics of physician-nurse and physician-family communication that predicted higher ratings for quality of dying. In their model, those elements of communication strongly associated with quality represent targets for interventions to improve care. Their analysis showed that regarding physician-family communication: answering family questions about illness/treatment; listening to families; asking about patient preferences; and assisting with decision making were associated with higher ratings of quality of dying. Regarding physician-nurse communication, discussing families' questions, family dynamics, spiritual considerations and cultural considerations were associated with higher quality of dying. However, when nurses felt compelled to discuss concerns about patient/family issues, quality of dying was more poorly rated.

Comments

1. Findings from this study suggest that physician-nurse and physician-family communication both have a role in quality of care at EOL.
2. Those communication components most strongly associated with higher quality of dying are all elements of the shared decision making process; findings of this study indicate that processes promoting high-quality shared decision making are promising targets for intervention.
3. Early identification of nurse-perceived concerns about the patient and family, along with processes to address those concerns represent additional targets for future intervention.

OTHER ARTICLES OF INTEREST

White DB, Ernecoff N, Buddadhumaruk P, Hong S, Weissfeld L, Curtis JR, Luce JM, Lo B. **Prevalence of and factors related to discordance about prognosis between physicians and surrogate decision makers of critically ill patients.** *JAMA* 2016;315:2086-94.

White DB. **Strategies to support surrogate decision makers of patients with chronic critical illness: The search continues.** *JAMA* 2016;316:35-7.

Swartze ML, Campbell TC, Cunningham TV, White DB, Arnold RM. **You can't get what you want: Innovation for end-of-life communication in the intensive care unit.** *Am J Respir Crit Care Med* 2016; 193: 14-6.

TOPICS IN ONCO-CRITICAL CARE

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SLEEP IN CRITICALLY ILL PATIENTS WITH CANCER

Matthews EE, Tanner JM, Dumont NA. **Sleep Disturbances in Acutely Ill Patients with Cancer.** *Critical care nursing clinics of North America.* 2016 28(2), 253-268.

Summary

This paper, targeted to clinicians, describes sleep problems in critically ill patients who have cancer. Sleep disorders are common in the general population and are present in critically ill patients, especially in older adults. Patients with cancer also have increased risk of sleep disturbance related to treatment and complications of cancer. This places the patient with cancer at particular risk for sleep disturbance when they are critically ill. Sleep is necessary for immune and metabolic function, and disturbed sleep is linked to poor cognitive and psychological function. The authors of this paper review risk factors, objective and subjective assessment tools, and potential treatment for sleep disturbances that cancer patients experience in the ICU. They suggest standard screening for sleep disorders and potential appropriate interventions to improve sleep architecture while the patient is in the ICU. They also support the need for additional studies in this area to determine the most effective methods to assess sleep and provide evidence for suitable interventions for sleep disturbances in this population.

Comments

1. Patients with cancer are at high risk for sleep disturbance while in the ICU. Sleep disturbance is under-reported in critically ill patients with any diagnosis.
2. Sleep disturbances have profound negative effects in critically ill patients with cancer including alterations in immune, metabolic, neurocognitive and psychological function.
3. Sleep disturbances can be pre-existing, related to cancer itself or acquired during the critical illness.
4. Screening and treatment for sleep disturbances should be undertaken routinely.
5. Additional studies are necessary to guide the evidence necessary for providers to make decisions about sleep disturbances in this population

HEALTH SERVICES IN ONCO-CRITICAL CARE

Gutierrez C, Cardenas YR, Bratcher K, Melancon J, Myers J, Campbell JY, Nates JL. **Out-of-Hospital ICU Transfers to an Oncological Referral Center: Characteristics, Resource Utilization, and Patient Outcomes.** *Journal of Intensive Care Medicine.* 2016 10.1177

Summary

Few studies of the outcomes, characteristics and resource utilization have been undertaken of oncology patients admitted to the ICU in a cancer referral center from an outside hospital. This was a single center cohort study to determine resource utilization and outcome of out-of-hospital transfers admitted to the ICU in a cancer referral center. Resource utilization was defined as use of vasopressors, mechanical ventilation, hemodialysis and other interventions such as bronchoscopy, thoracentesis, etc. Comparisons were made between out-of-hospital transfers (n=228) and ED ICU admissions (n=2127). Out-of-hospital transfers were admitted new leukemia, respiratory failure and encephalopathy. Patients admitted to the ICU from the ED were more likely to have sepsis or septic shock ($p < .008$). Most transfers occurred within the state and had mean LOS at the outside hospital of 5.3 +/- 9.3 days. Comparisons were made between those patients admitted through the ED and those transferred from out-of-hospital. Out-of-hospital transfers were more likely to have acute renal failure and less need for vasopressors than those patients admitted through the ED. There was no significant difference between groups in use of MV, severity of illness or mortality. However, ICU LOS was longer in the out-of-hospital transfer group. Of those patients transferred from an outside hospital, some needed a higher level of care (n=176) while others a non-higher level of care (n=52). Patients transferred to a higher level of care tended to be younger ($p = .0059$), less likely to be a known patient ($p < .0001$), required mechanical ventilation ($p = .022$) and had lower Charlson Co-morbidity Index scores ($p = .00001$). The most common admission diagnoses of those who needed transferred to a higher level of care were hyperleukocytosis and leukemia, respiratory failure and severe sepsis and septic shock. There was no differences between patients admitted to a higher level of care and those admitted to a lower level of care in SOFA score, length of stay at outside facility, need for vasopressor or incidence of acute kidney injury. Length of stay, duration of mechanical ventilation, ICU readmission and ICU/hospital mortality were similar between groups.

Comments

1. Outcomes of out-of-hospital transfers of oncology patients to an oncology referral center were the same as those patients admitted through the ED.
2. Out-of-hospital transfer of critically ill oncology patients do not lead to increase in mortality. Although transport may contribute to physiologic instability, these changes did not contribute to mortality.

3. Clinical status of oncology patients at the time of transfer predict patient outcomes in this population.
4. Critically ill oncology patients may benefit from care at a center dedicated to specialized cancer care as the needs of oncology patients are unique.

PEDIATRIC ONCO-CRITICAL CARE

Kassam A, Sutradhar R, Widger K, Rapoport A, Pole JD, Nelson K, Wolfe J, Earle CC, Gupta S. **Predictors of and Trends in High-Intensity End-of-Life Care among Children with Cancer: A Population-Based Study Using Health Services Data.** *Journal of Clinical Oncology*, 2016. 35(2), 236-242.

Summary

The purpose of this study was to determine predictors of and trends in end of life (EOL) treatment intensity in children with cancer using population based data in Toronto. High intensity (HI) EOL treatment includes: intravenous chemotherapy, 14 days from death; more than one emergency department visit; and more than one hospitalization or intensive care unit admission, 30 days from death. Additionally, measures of the most invasive (MI) EOL care, such as mechanical ventilation, were determined. Of 815 patients included, 40.6% (n=331) experienced HI-EOL. Patients with hematologic cancers were more likely to experience HI-EOL care (odds ratio, 2.5; 95% CI, 1.8 to 3.6; $P < .001$). Patients who received MI-EOL care were more likely to experience in-hospital death. Interestingly, over time utilization of HI-EOL care is increasing despite trends in improved palliative care.

Comments

1. Children with cancer experience high-intensity end of life (HI-EOL) care at a higher proportion than adults.
2. Children with hematologic malignancies are at greatest risk of receiving HI-EOL care.
3. The most intensive measures of EOL care in children have increased in the last decade.
4. Explanations for these results include parental recognition of prognosis for their children, reluctance of pediatric oncologists to lead discussion of advanced care planning with parents and children, and family preference for death in the hospital increases over time.

OUTCOMES

Torres VB, Vassalo J, Silva UV, Caruso P, Torelly AP, Silva E, Teles JM, Knibel M, Rezende E, Netto JJ, Piras C, Azevedo LC, Bozza FA, Spector N, Sallugh JI, Soares M. **Outcomes in critically ill patients with cancer-related complications.** *PloS one*, 2016 11(10), e0164537.

Summary

The purpose of this study was to determine the association between clinical characteristics and outcomes for patients

admitted to ICUs with complications related to cancer or its treatment. Two prospective cohort studies of critically ill cancer patients (n=2028) were analyzed. The first study was conducted at a single center and the second was conducted at 28 Brazilian ICUs. Variables associated with hospital mortality were determined via logistic regression and included demographics, comorbidities, diagnoses, severity of illness scores using Sequential Organ Failures Assessment [SOFA and Simplified Acute Physiology Scores (SAPS II)], cancer and treatment related variables including presence of metastases, grade and performance status (PS). Acute complications related to treatment (chemo- or radiation therapies) and infection or sepsis were also documented. Logistic regression models were performed to determine the association between mortality and cancer-related complication; the association between mortality and number of complications; and the prognostic impact of individual complications. Patients with solid tumors were 86% of the sample (n= 1737) and patients with hematologic malignancies were 14% (n=291). Patients (n=456; 23%) were admitted to the ICU with a complication related to cancer. Patients with complications were younger, had more frequently worse PS, active disease, higher organ dysfunction, need for invasive support and infection at ICU admission. Patients who had cancer related complications were at risk for ICU and hospital mortality. The presence of cancer related complications was not associated with mortality in the multivariate analysis [odds ratio (OR) = 1.25 (95% confidence interval, 0.94±1.66), $P = 0.131$]. Those patients with cancer-related complications who had vena cava syndrome [OR = 3.79 (1.11±12.92), $P = 0.033$], gastrointestinal involvement [OR = 3.05 (1.57±5.91), $P = <0.001$] and respiratory failure [OR = 1.96(1.04±3.71), $P = 0.038$] experienced higher in-hospital mortality. The impact of cancer-related complications on outcomes of patients who become critically ill varies. Patients with acute cancer-related complications present clinicians with complex triage and treatment decisions. Presence of complications should not be used as the sole factor to deny admission of the patient to the ICU or to limit life-sustaining interventions.

Comments

1. Critically ill patients with cancer have increased and outcomes have improved over the last decades. Yet cancer diagnosis remains a key reason for denial of ICU admission.
2. Clinical decisions can be based on evidence about those patients who are most likely to benefit from an admission to the ICU.
3. Cancer-related complications, either directly related to the malignancy or its treatment, represent about 25% of the ICU admissions in this cohort.
4. The prognostic impact of cancer-related complication is variable.
5. Outcomes in patients with cancer-related complications are better than expected.
6. Cancer-related complications should not be the sole factor for denying admission to the ICU or for limiting life-sustaining interventions.

ICU SURVIVORSHIP

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EMPLOYMENT OUTCOMES AFTER CRITICAL ILLNESS

Norman BC, Jackson JC, Graves JA, et al. **Employment Outcomes After Critical Illness: An Analysis of the Bringing to Light the Risk Factors and Incidence of Neuropsychological Dysfunction in ICU Survivors Cohort.** *Critical Care Medicine*. 2016;44(11):2003-2009.

Summary

This prospective cohort study aimed to (1) characterize changes in employment status after critical illness at 3 and 12 months post-ICU discharge and (2) examine the effect of delirium during ICU stay and post-ICU cognitive function on employment status. Participants were 113 medical and surgical ICU survivors who were identified as being employed prior to their critical illness. Primary outcome was a self-reported decrease in employment level (e.g., going from employed full time to employed part time or unemployed, or going from employed part time to unemployed) reported by the patient or surrogate at 3 and 12 months post-ICU discharge. Independent variables were total days of delirium during ICU stay (daily CAM-ICU for up to 30 days) and cognitive function assessment (the Repeatable Battery for the Assessment of Neuropsychological Status) at 3 and 12 months post-ICU discharge. At 3 months, 70 (62%) ICU survivors reported decreased employment. At 12 months, among 96 ICU survivors who were available for follow-up, 79 (70%) reported decreased employment. After adjusting for physical health status, depressive symptoms, marital status, education and severity of illness, there was no significant association between delirium duration, cognitive function and decreased employment at 3 months. At 12 months, there was a marginal association between better cognitive function and lower odds of decreased employment.

Comment

1. Many ICU survivors are having difficulty maintaining pre-critical illness employment up to a year after ICU discharge.
2. Although the main hypotheses were not supported, the marginal association between cognitive function and employment at 12 months suggests delayed recovery of cognitive function after critical illness may have greater influence on survivors' ability to maintain employment.
3. Including only ICU survivors who were previously employed is a strength of this report.
4. Future studies are needed to better address the impact of physical, psychological and cognitive sequelae of critical illness on employment after ICU discharge

RCT TESTING INTERVENTIONS TO IMPROVE ICU SURVIVORSHIP (1) A PRIMARY CARE MANAGEMENT INTERVENTION FOR SEPSIS SURVIVORS

Schmidt K, Worrack S, Von Korff M, et al. **Effect of a Primary Care Management Intervention on Mental Health-Related Quality of Life Among Survivors of Sepsis: A Randomized Clinical Trial.** *JAMA*. 2016;315(24):2703-2711

Summary

Managing sequelae of critical illness in primary care settings may be a way to improve outcomes in sepsis survivors. This RCT aimed to examine effects of a primary care-based intervention focusing on monitoring and coordinating of sepsis survivors on mental health related quality of life at 6 months post-ICU discharge. A sample of 291 adult patients who survived sepsis (or septic shock) were recruited in 9 ICUs in Germany and randomized to an intervention (n=148) or usual care (n=143) group. Patients assigned to the intervention group worked closely with trained case managers. Case managers provided face-to-face training on sepsis sequelae using a self-help booklet (started as early as 8 days post-ICU discharge) followed by monthly telephone contacts for 6 months and bimonthly telephone contacts for additional 6 months (12 months total). Case managers communicated with assigned consulting physicians with background in both primary and critical care to provide clinical decision support for primary care physicians (PCPs). Consulting physicians also provided individual training on evidence based sepsis aftercare to PCPs. Primary outcome was change in mental health-related quality of life between ICU discharge and 6 months post-ICU discharge measured by the Mental Component Summary of the 36-item Short Form Health Survey (SF36-MCS). There was no significant difference in the mean SF-36 MCS score between the intervention and control groups.

Comments

1. This large RCT first tested a primary care based intervention to promote support to sepsis survivors by activating both patients and PCPs.
2. Despite multiple strengths (e.g., successful participant recruitment, successful integration of essential intervention components), there was no significant difference between intervention and control groups in primary outcomes (SF-36 MCS score) and a majority of secondary outcomes at 6 months post-ICU discharge, except favorable changes in physical function, physical disability and impairment of activity of daily living in intervention group at 6 months.

3. At baseline, SF-36 MCS score was already similar to healthy population norms.
4. Primary outcome measure (SF-36 MCS score) might have been too broad to capture meaningful effects of the intervention program which included supports to various physical and psychological needs relevant to sepsis survivors.

RANDOMIZED CONTROLLED TRIAL (RCT) TESTING INTERVENTIONS TO IMPROVE ICU SURVIVORSHIP (2) THE RAPIT TRIAL (RECOVERY AND AFTERCARE IN POSAT-INTENSIVE CARE THERAPY PATIENTS)

Jensen JF, Egerod I, Bestle MH, et al. **A recovery program to improve quality of life, sense of coherence and psychological health in ICU survivors: a multicenter randomized controlled trial, the RAPIT study.** *Intensive Care Medicine*. 2016;42(11):1733-1743.

Summary

This pragmatic, non-blinded, multicenter, parallel group RCT tested the effectiveness of a nurse-led post-ICU recovery program on health related quality of life (HRQOL), sense of coherence, anxiety, depression, post-traumatic stress disorder and health care service use for one year post-ICU discharge in 386 adult patients who underwent mechanical ventilation (48 hours or longer) in 10 ICUs in Denmark. Participants were randomized to the intervention group (a nurse-led recovery program + standard care, n=190) or control group (standard care only, n=196). The nurse-led intervention involved receipt of information pamphlet "Life after ICU" and three consultation sessions (1-3 months, 5 months and 10 months post-ICU discharge). First consultation, delivered face-to-face at the clinic, focused on helping the patient construct an illness narrative. Second and third consultations, delivered via telephone, focused on providing support based upon issues listed in "reflection sheets" completed by a patient prior to each session. Standard care included light sedation, early mobilization, daily CAM-ICU delirium assessment, written information for visitors and physical rehabilitation. HRQOL was measured at 12 months post-ICU discharge and the rest of outcomes were measured at 3 and 12 months. At 12 months, there were no significant differences in any outcome variable between two groups.

Comments

1. This RCT tested a nurse-led recovery program to help ICU survivors to construct coherent narratives of critical illness experience by providing 3 consultations over 10 months after ICU discharge.
2. Physical rehabilitation was offered to all participants but actual participation was low in both intervention and control groups, which might have affected no improvement in primary outcomes.
3. This intervention has potential for improvement by refining its target, tailoring strategies and outcome measurements.

OUTCOMES OF FAMILY CAREGIVERS

Cameron JI, Chu LM, Matte A, et al. **One-Year Outcomes in Caregivers of Critically Ill Patients.** *The New England Journal of Medicine*. 2016;374(19):1831-1841.

Summary

This multicenter longitudinal study described health outcomes of family caregivers of ICU patients (on mechanical ventilation ≥ 7 days) for 12 months post-ICU discharge. At 7 days, 3, 6, and 12 months post-ICU discharge, caregivers were asked to administer questionnaires measuring depressive symptoms (20-item CESD), psychological well-being (10-item Positive Affect Scale of the Positive and Negative Affect Schedule), physical and mental health (Physical Component Summary and Mental Component Summary of the SF-36) and additional questionnaires measuring sense of control over life and effect of caregiving on other activities. Among 280 caregivers enrolled, 154 (55%) completed all four assessments. The percentage of caregivers at high risk for clinical depression (CESD score ≥ 16) was high (67% at 7 days, 49% at 3 months, 43% at 6 months and 43% at 12 months). Depressive symptoms decreased over time in 83.6% of caregivers, but remained high for one year in 16.4 %. Factors associated with worse scores in depressive symptoms, psychological well-being and mental health were: younger caregiver age, greater effect of caregiving on other activities, less social support, less sense of control over life, and less perceived personal growth. There was no association between caregiver outcomes and patient characteristics and outcomes..

Comments

1. Family caregivers reported high prevalence of negative psychological responses over the first one year after patients' ICU discharge.
2. In some caregivers, psychological symptoms persisted and did not decrease for one year follow-up period.
3. A further descriptive study is warranted to investigate if trajectories of caregivers' psychological responses are influenced by caregivers' pre-existing mental health issues or caregiving experience prior to the episode of critical illness.

UPDATES ON THE USE OF TELEMEDICINE IN THE ICU

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MORE DATA ON IMPACT OF ICU TELEMEDICINE ON MORTALITY

Kahn JM, Le TQ, Barnato AE et al. **ICU telemedicine and critical care mortality.** *Medical Care* 2016;54:319-325.

Summary

This multicenter retrospective case control study explored the effectiveness of ICU telemedicine in a national sample of hospitals and quantified variation in effectiveness across hospitals. Medicare claims data were linked to a national survey identifying U.S. hospitals adopting ICU telemedicine. Using ICU admissions from 2 years before and after the adoption date, outcomes were compared between case and control hospitals. A total of 132 adopting case hospitals were matched to 389 similar non-adopting control hospitals. The preadoption and postadoption unadjusted 90-day mortality was similar in both case hospitals (24.0% vs. 24.3%, $P = 0.07$) and control hospitals (23.5% vs. 23.7%, $P < 0.01$). ICU telemedicine adoption was associated with a small relative reduction in 90-day mortality (ratio of odds ratios = 0.96; 95% CI, 0.95–0.98; $P < 0.001$). However, there was wide variation in the ICU telemedicine effect across individual hospitals (median ratio of odds ratios = 1.01; interquartile range, 0.85–1.12; range, 0.45–2.54). Only 16 case hospitals (12.2%) experienced statistically significant mortality reductions postadoption. Hospitals with a significant mortality reduction were more likely to have large annual admission volumes ($P < 0.001$) and be located in urban areas ($P = 0.04$) compared with other hospitals. The results of the study demonstrate that although ICU telemedicine adoption resulted in a small relative overall mortality reduction, there was heterogeneity in effect across adopting hospitals, with large-volume urban hospitals experiencing the greatest mortality reductions.

Comments

1. The use of ICU telemedicine has expanded dramatically in recent years, with over 10% of all ICU beds in the United States covered by a telemedicine program. However, despite this rapid expansion, concerns persist about the effectiveness of ICU telemedicine.
2. To further explore the impact of ICU telemedicine, this study conducted a national review of ICU telemedicine effectiveness using Medicare claims data, examining mortality before and after the introduction of ICU telemedicine in a large number of adopting hospitals and comparing these temporal changes to control hospitals that did not adopt ICU telemedicine.
3. A patient level retrospective study was conducted of Medicare beneficiaries admitted to U.S. hospitals between 2001 and 2010 for 132 hospitals using ICU telemedicine. This data was matched to a control group of non-adopting hospitals that were similar in size, case-mix, and geography.

4. The results of the study demonstrated that adoption of ICU telemedicine was associated with a small but statistically significant relative reduction in the overall odds of 90-day mortality (ratio of odds ratios = 0.96; 95% confidence intervals, 0.94–0.98; $P < 0.001$).
5. In studying a large number of adopting hospitals, this study identified that the treatment heterogeneity evident in the single-center literature is not necessarily an artifact of study design but is instead an inherent characteristic of ICU telemedicine, with some ICUs greatly benefiting from the technology and others receiving no significant benefit.

EXPLORING THE FINANCIAL IMPACT OF ICU TELEMEDICINE

Lilly CM, Motzkus C, Rincon T, et al. **ICU Telemedicine Program Financial Outcomes.** *CHEST*, 2017;151:286-297

Summary

This single center study compared clinical and financial outcomes across three groups (over 50,000 patients) receiving ICU telemedicine: a group without ICU telemedicine support (pre-ICU intervention group), a group with ICU telemedicine support (ICU telemedicine group), and an ICU telemedicine group with added logistic center functions and support for quality-care standardization (logistic center group). Aggregated annual case revenue and annual case direct costs (including operating costs of ICU telemedicine and its related programs) were examined. The results indicated that the annual case volume increased from 4,752 (pre-ICU telemedicine) to 5,735 (ICU telemedicine) and 6,581 (logistic center). The annual direct contribution margin improved from \$7,921,584 (pre-ICU telemedicine) to \$37,668,512 (ICU telemedicine) to \$60,586,397 (logistic center) due to increased case volume, higher case revenue relative to direct costs, and shorter length of stay. The study provides additional information on the impact of ICU telemedicine programs on case volume and critical care access and the associated costs. The results of the study identified improved financial impact from the use of tele-ICU systems and the authors advocate for expansion of tele-ICU care.

Comments

1. Understanding the costs and benefits associated with tele-ICU care is important for defining the role of this evolving technology for increasing access to efficient, high-quality, and safe adult critical care.
2. The study identified a consecutive case cohort of 51,203 subjects from seven adult ICUs on two campuses of an 834-bed academic medical center to assess financial and clinical outcomes

3. Implementation of the ICU telemedicine center and the addition of logistic center functions were associated with significant and incrementally shorter durations of hospital length of stay.
4. Costs per case increased during the first years following the introduction of the ICU telemedicine program, in part due to the operating costs of the ICU telemedicine program
5. Improved operational efficiency allowed recovery of the initial capital costs of the ICU telemedicine program in < 3 months.
4. A total of 7689 patients were treated during the study time period. Of these, 6652 patients were directly admitted to the SICU and 1037 were admitted to the VICU. Of those admitted to the VICU, 28% transitioned to the SICU.
5. During the study period, total (SICU plus VICU) volume increased 13%, from 1993 to 2284 patients with majority of these patients (n=750, 72%) transferred from the VICU directly to the floor, bypassing the conventional ICU.

EXEMPLAR OF USE OF ADVANCED PRACTICE NURSES IN ICU TELEMEDICINE

Collins TA, Robertson MP, Sicoutris CP. **Telemedicine coverage for post operative ICU patients.** *Journal of Telemedicine and Telecare* 2016;23:360-364.

Summary

This single center study sought to create a surge capacity model to increase ICU capacity by treating ICU patients in the post-anaesthesia care unit (PACU) utilizing a collaborative model between an ICU service and a telemedicine service during peak ICU bed demand. Patients managed by the surgical critical care service in the surgical intensive care unit (SICU) including nurse practitioners were compared to patients managed in the virtual intensive care unit (VICU) located within the PACU. A retrospective review of all patients seen by the surgical critical care service was conducted from January 1st 2008 to July 31st 2011. Compared to the SICU group (n = 6652), patients in the VICU group (n = 1037) were slightly older [median age 60 (IQR 47–69) versus 58 (IQR 44–70) years, $p = 0.002$] and had lower acute physiology and chronic health evaluation (APACHE) II scores (median 10 (IQR 7–14) versus 15 (IQR 11–21), $p < 0.001$). In the VICU group, 750 (72%) of patients were able to be transferred directly to the floor; 287 (28%) required subsequent admission to the SICU. All patients in the VICU group were alive upon transfer out of the PACU while mortality in the SICU unit cohort was 5.5%. The results of the study demonstrated that a collaborative care model between a surgical critical care service and a telemedicine ICU service with the use of nurse practitioners may safely provide surge capacity during peak periods of ICU bed demand.

Comments

1. Telemedicine systems can increase scalability and increase capacity to utilize existing intensivists over a larger population or geographic area, thus allowing hospitals to increase volume and capacity.
2. A four-bed virtual ICU (VICU) was created within a 36-bed PACU to increase ICU capacity by treating ICU patients in the PACU utilizing telemedicine service and nurse practitioners during peak ICU bed demand.
3. A 3 year retrospective review of all patients was conducted to compare patients admitted directly to the SICU compared to those admitted directly to the VICU. The primary outcome measurement was mortality. Other outcomes included length of stay and ICU discharge disposition.

TELE-ICU NURSE PERCEPTIONS OF ICU TELEMEDICINE

Hoonakker PL, Pecanac KE, Brown R, Carayon P. **Virtual collaboration, satisfaction, and mutual trust between nurses in the tele-ICU and ICUs: Results of a multilevel analysis.** *Journal of Critical Care* 2017;37:224-229.

Summary

The purpose of the study was to examine how tele-intensive care unit (tele-ICU) nurse characteristics and organizational characteristics influence tele-ICU nurses' trust and satisfaction of monitored bedside ICU nurses, and whether these influences are mediated by communication. Data was collected at 5 tele-ICUs in the United States with respect to tele-ICU characteristics and characteristics of the ICUs they monitored. A sample of 110 nurses working in tele-ICU completed a questionnaire containing items related to their characteristics and their trust, satisfaction, and perceived communication with monitored bedside nurses. We analyzed the data using a hierarchical path model, with communication variables entered as mediators. A number of tele-ICU nurse characteristics (age, currently or previously worked at the monitored ICU, hours worked per week, and years as a ICU nurse) had statistically significant direct effects on perception of communication timeliness, accuracy, and openness, as well as trust and satisfaction with monitored bedside ICU nurses. Communication openness mediated the relationships of both working at a monitored ICU and being older (≥ 55) on satisfaction. Communication accuracy mediated the relationships of both a specialized monitored ICU and working at a monitored ICU on trust. The results of the study identified that tele-ICUs and monitored ICUs should work to optimize communication so that trust can be established among the nurses working in both settings.

Comments

1. One key characteristic of the tele-ICU is that the relationship between health care practitioners in the tele-ICUs and monitored ICUs is a form of virtual collaboration, where trust plays an important role as a foundation for effective collaboration.
2. This study collected data at 5 large tele-ICUs to assess characteristics of the tele-ICU and the ICUs that they monitored including nurses' characteristics, such as personal information (age, highest level of education) and work-related information (hours worked per week, whether the nurse works or has worked in an ICU that the tele-ICU monitors, and years of experience working as a nurse in an ICU); nurses' trust and satisfaction of the bedside ICU nurses they monitor, and nurses' assessment of communication with ICU staff nurses.

3. Measures of communication included 9 items that grouped into 3 scales: (1) communication openness, (2) communication accuracy, and (3) communication timeliness.
4. The results of the study demonstrated that the mean scores for the different types of communication (openness, accuracy, and timeliness) were relatively low (on a scale from 0 to 100) and that there was considerable variation between the 5 tele-ICUs.
5. The results highlighted that there are moderately strong relationships between communication openness, accuracy, and timeliness and satisfaction and trust in the ICUs. There were no statistically significant differences between the tele-ICUs on mean scores for satisfaction and trust, however there was considerable variation of satisfaction and trust within the ICUs that were monitored by the tele-ICUs. Tele-ICU nurses who worked more hours each week had more trust in the monitored ICUs ($P < .05$). The age of the tele-ICU nurse was also associated with the perception of the communication received from the monitored ICU. Compared with younger tele-ICU nurses, older tele-ICU nurses (≥ 55 years old) were less likely to report experiencing open communication with the monitored ICUs. The findings demonstrate the importance of communication on tele-ICU nurses' trust and satisfaction of monitored ICUs.

EXPLORING PRIORITY AREAS OF CARE FOR TELE-ICU NURSING

Kleinpell RM, Barden C, Rincon T, et al. **Assessing the impact of telemedicine on nursing care in the ICU.** *American Journal of Critical Care* 2016;25:e14-e20.

Summary

This 2-phase study used an online survey to conduct a national benchmarking survey of nurses working in intensive care telemedicine facilities in the United States to assess nurses' perceptions of intensive care telemedicine. A modified 2-round Delphi study was then used to identify priority areas of tele-ICU nursing. In phase 1, most of the 1213 respondents agreed to strongly agreed that using tele-ICU enables them to accomplish tasks more quickly (63%), improves collaboration (65.9%), improves job performance (63.6%) and communication (60.4%), is useful in nursing assessments (60%), and improves care by providing more time for patient care (45.6%). Benefits of tele-ICU included ability to detect trends in vital signs, detect unstable physiological status, provide medical management, and enhance patient safety. Barriers to using telemedicine in the ICU included technical problems (audio and video), interruptions in care, perceptions of telemedicine as an interference, and attitudes of staff. In phase 2, 60 nurses ranked 15 priority areas of care, including critical thinking skills, intensive care experience, skillful communication, mutual respect, and management of emergency patient care. The findings of the study can be used to further inform the development of competencies for tele-ICU nursing, match the tele-ICU care nursing practice guidelines of the American Association of Critical-Care

Nurses, and highlight concepts related to the association's standards for establishing and sustaining healthy work environments.

Comments

1. This study examined critical care nurses' perceptions of intensive care telemedicine and priority areas of nursing.
2. A national survey of over 1200 critical care nurses was conducted to assess priority areas of nursing care related to tele-ICU.
3. The most important priority areas of care identified included critical thinking skills, expert clinician with ICU experience, skillful communication, mutual respect for bedside and tele-ICU colleagues and emergency patient care management.
4. Top rated competencies to tele-ICU nursing included skillful communication, mutual respect for tele-ICU and bedside staff, clinical knowledge of the tele-ICU system knowledge of hemodynamic monitoring, comfortable with technology, and ability to interact with multiple disciplines.

OTHER ARTICLES OF INTEREST

Buchman TG, Coopersmith CM, Meissen H, et al. **Innovative Interdisciplinary Strategies to Address the Intensivist Shortage.** *Critical Care Medicine* 2017 45(2):298-304.

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