

# Intensive Care Evidence Update



**April 2018**  
**(Quarterly)**

Respecting everyone  
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## Lunchtime Drop-in Sessions

*All sessions last one hour*

### April (12.00-13.00)

5th (Thu) **Literature Searching**

9th (Mon) **Critical Appraisal**

17th (Tue) **Statistics**

25th (Wed) **Literature Searching**

### May (13.00-14.00)

3rd (Thu) **Critical Appraisal**

11th (Fri) **Statistics**

14th (Mon) **Literature Searching**

22nd (Tue) **Critical Appraisal**

30th (Wed) **Statistics**

### June (12.00-13.00)

7th (Thu) **Literature Searching**

11th (Mon) **Critical Appraisal**

20th (Wed) **Statistics**

28th (Thu) **Literature Searching**

## Your Outreach Librarian- Jo Hooper

Whatever your information needs, the library is here to help. As your Outreach Librarian I offer **literature searching services** as well as training and guidance in **searching the evidence** and **critical appraisal** – just email me at [library@uhbristol.nhs.uk](mailto:library@uhbristol.nhs.uk)

**Outreach:** Your Outreach Librarian can help facilitate evidence-based practise for all in the oral and maxillofacial surgery team, as well as assisting with academic study and research. We can help with **literature searching, obtaining journal articles and books**, and setting up individual **Evidence Updates**. We also offer one-to-one or small group training in **literature searching, accessing electronic journals, and critical appraisal**. Get in touch: [library@uhbristol.nhs.uk](mailto:library@uhbristol.nhs.uk)

**Literature searching:** We provide a literature searching service for any library member. For those embarking on their own research it is advisable to book some time with one of the librarians for a one-to-one session where we can guide you through the process of creating a well-focused literature research and introduce you to the health databases

# Tables of Contents from Critical Care journals

The links below will take you to the full Tables of Contents.

The Library does not have a subscription for all the journals listed, but we can always source the articles through **interlibrary loan**. If you require full text articles please email: [library@uhbristol.nhs.uk](mailto:library@uhbristol.nhs.uk).

## **Critical Care Medicine**

April 2018, Volume 46, Issue 4

## **Current Opinion in Critical Care**

April 2018, Volume 24, Issue 2

## **Critical Care**

March 2018, Volume 22

## **Intensive and Critical Care Nursing**

April 2018, Volume 45

## Nursing Journals:

### **Nursing Times**

April 2018

### **Nursing Standard**

March 28 2018, Volume 33, Issue 1

### **Nursing in Critical Care**

March 2018, Volume 23, Issue 2

# Updates

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## [Predictive scoring systems in the intensive care unit](#)

- [Specific ICU populations](#)
- [Acute Physiologic and Chronic Health Evaluation \(APACHE\)](#)
- [Summary and recommendations](#)

**Literature review current through:** Mar 2018. | **This topic last updated:** Apr 03, 2018.

## [What's new in pulmonary and critical care medicine](#)

- [Method of terminal extubation in terminally ill ICU patients \(December 2017\)](#)
- [Methylprednisolone in acute respiratory distress syndrome \(January 2018\)](#)

**Literature review current through:** Mar 2018. | **This topic last updated:** Apr 25, 2018.

## [Withholding and withdrawing ventilatory support in adults in the intensive care unit](#)

- [Approaching conversations in the critically ill patient](#)
- [Summary and recommendations](#)

**Literature review current through:** Mar 2018. | **This topic last updated:** Jan 10, 2018.

## [Treatment of hospital-acquired and ventilator-associated pneumonia in adults](#)

- [Duration](#)
- [Ventilator-associated pneumonia](#)
- [Summary and recommendations](#)

**Literature review current through:** Mar 2018. | **This topic last updated:** Mar 27, 2018.

## [Risk factors and prevention of hospital-acquired and ventilator-associated pneumonia in adults](#)

- [Prevention](#)
- [Pneumonia types](#)
- [Summary](#)

**Literature review current through:** Mar 2018. | **This topic last updated:** Mar 19, 2018.

## [Infections and antimicrobial resistance in the intensive care unit: Epidemiology and prevention](#)

- [Ventilator associated pneumonia](#)
- [Summary and recommendations](#)

**Literature review current through:** Mar 2018. | **This topic last updated:** Apr 26, 2018.



No relevant up to date evidence

[Planning the Transition to End-of-Life Care in Advanced Cancer \(PDQ®\)–Health Professional Version](#)  
[National Cancer Institute at the National Institutes of Health](#) Source: [National Cancer Institute, USA](#) -  
07 March 2018

[Effect of organisational factors on the variation in incidence  
of delirium in intensive care unit patients: A systematic review and meta-regression analysis](#)  
Source: [PubMed](#) - 12 March 2018 - Publisher: Australian Critical Care : Official Journal Of The  
Confederation Of Australian Critical Care Nurses [Read Summary](#)

[Flexible Versus Restrictive Visiting Policies in ICUs: A Systematic Review and Meta-Analysis](#)  
Source: [PubMed](#) - 10 April 2018 - Publisher: Critical Care Medicine [Read Summary](#)



## Library Clinic

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- April 4<sup>th</sup>: **Foyer, Education Centre** 12.00-14.00
- April 11<sup>th</sup>: **Foyer, St Michael's Hospital** 12.00-14.00
- May 2<sup>nd</sup>: **Canteen (Level 9, BRI)** 12.00-14.00
- June 6<sup>th</sup>: **Terrace (Level 4, Education Centre)** 12.00-14.00
- June 19<sup>th</sup>: **Welcome Centre, BRI** 10.00-16.00
- July 3<sup>rd</sup>: **Welcome Centre, BRI** 10.00-16.00
- July 4<sup>th</sup>: **Canteen (Level 9, BRI)** 12.00-14.00
- August 8<sup>th</sup>: **Foyer, Education Centre** 12.00-14.00
- August 29<sup>th</sup>: **Foyer, St Michael's Hospital** 12.00-14.00
- September 5<sup>th</sup>: **Canteen (Level 9, BRI)** 12.00-14.00
- September 11<sup>th</sup>: **Welcome Centre, BRI** 10.00-16.00
- October 3<sup>rd</sup>: **Terrace (Level 4, Education Centre)** 12.00-  
14.00
- November 7<sup>th</sup>: **Canteen (Level 9, BRI)** 12.00-14.00
- December 5<sup>th</sup>: **Foyer, Education Centre** 12.00-14.00
- December 11<sup>th</sup>: **Welcome Centre, BRI** 10.00-16.00

## Departmental News

News, Research, Conferences, Training etc

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## Recent Database Articles

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### Ventilation Pneumonia and Oral Care

#### The Oral Biofilm Index in patients hospitalized on an intensive care unit

**Author(s):** Marinho R.; Marinho J.; Marinho A.; Frias-Bulhosa J.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:** Introduction: The oral cavity of a patient who has been hospitalized presents a different flora from normal healthy people. After 48h hours of hospital stay, the flora presents a bigger number of microorganisms that can be responsible for secondary infections, like pneumonia, because of their growth and proliferation. The objective of our study was to assess the dental plaque index on patients on admission to an Intensive Care Unit, and reassess 7 days later, to evaluate the efficacy of oral hygiene. Methods: Prospective, descriptive and observational study in an Intensive Care Unit of the CHP. Demographic, admission motive, hospital length of stay, feeding protocol, respiratory support need and oral hygiene protocol data was collected. The Greene & Vermillion Simplified Oral Hygiene Index (IHO-S) was used as the assessment tool on the first 24h and on 7th day. Results: 74 patients were evaluated, 42 of which were excluded for not meeting the minimal dentition. 32 patients had a mean age of 60, 53 +/- 14, 44 years, 53, 1% were males and most of medical and surgical scope (37, 5% each). Mean hospital length of stay was 15, 69 +/-6, 69 days. The majority of patients were sedated (75%), under ventilator support (81, 3%) and with enteric nutritional support, under nasogastric tube feeding. Initial IHO-S score was 0, 67+/-0, 45, rising to 1, 04+/-0, 51 (p<0, 05) 7 days later. Conclusions: Various studies have proven the importance of a good oral hygiene to avoid bacterial growth and reduce the risk for nosocomial infections. In this study, we've observed a significant worsening of oral hygiene one week after admission. Although this could be unimportant for a one week staying patient, it could indicate an increased risk for nosocomial infections for longer staying patients, which could benefit from a more efficient oral hygiene protocol.

#### Impact of adhesion of ventilatory weaning protocol on the incidence rate of pneumonia associated with mechanical ventilation in the tracheostomized patient

**Author(s):** Travassos P.; Teixeira E.; Freitas L.; Darin P.; Junqueira L.; Kawagoe T.; Postalli N.; Vale R.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: Ventilatory weaning protocols are important for the reduction of pneumonia associated with mechanical ventilation in tracheostomized patients. The objective of this study was to evaluate the impact of the adherence of the ventilatory weaning protocol on the incidence rate of pneumonia associated with mechanical ventilation in the tracheostomized patient in a large hospital neurological intensive care unit. Methods: The tracheostomized patients were retrospectively assessed from January 2015 to May 2017, correlating time of ventilatory weaning and pneumonia associated with mechanical ventilation. Results: In the period, 8, 485 patients were admitted to the unit, with a mean age of 66.5 years, with an average stay of 5.6 days; 56% of the hospitalizations were surgical, with an expected mortality of SAPS3 of 22.3% and real mortality of 11.2%. In this group, 497 were tracheostomized patients and 276 eligible for ventilatory weaning according to institutional protocol. Ninety-six percent of patients completed ventilatory weaning. Prior to protocol initiation, the mean ventilatory weaning time was 12.8 days, which decreased to 5.2 days in 2015 and 1.6 days in 2016. The incidence rate of ventilator-associated pneumonia was 1.09 by 2015; 1.49 in 2016 and 0.75 in 2017. Conclusions: The implementation of ventilatory weaning protocol contributed safely to standardization of the weaning process in the unit, reduction of mechanical ventilation time and low rate of pneumonia associated with mechanical ventilation.

#### **Acinetobacter baumannii ventilator-associated pneumonia epidemiology, risk and prognosis factors**

**Author(s):** Sellami W.; Essmat W.; Ben Mrad I.; Hajjej Z.; Gharssallah H.; Labbene I.; Ferjani M.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: Ventilator-associated pneumonia (VAP) is the most common nosocomial infection in critically ill patients, reaching up to 30 to 50%, with a high mortality rate. Acinetobacter baumannii (AB) has emerged as a pathogen frequently incriminated in VAP's in Tunisia. The aim of this study was to describe the epidemiological characteristics of Acinetobacter baumannii VAP, to identify the risk factors and the predictors of poor outcome of VAP with AB. Methods: A retrospective study was conducted in the intensive care unit of the Military Hospital of Tunis, from January 2015 to December 2016. All patients with VAP's documented infection were included. VAP's patients with AB vs VAP's patients due to other pathogens. Results: Seventy patients (10%) developed VAP. The incidence of VAP with AB was 6.28%. Previous antibiotic therapy was identified as a risk factor for Acinetobacter baumannii-induced pneumonia, unlike the underlying disease. AB was resistant to ceftazidime in 100%, imipenem in 97.5% with sensitivity to colistin in 100% of cases. Multidrug-resistant AB accounted for 22.5% and highly resistant AB accounted for 77.5%. Patients with AB pneumonia were more frequently complicated by acute respiratory distress syndrome compared to other patients (37.5% versus 8.9%,  $p = 0.02$ ), leading to higher mortality (52.5% versus 20%,  $p = 0.02$ ). Conclusions: The increasing incidence of VAP in multidrug-resistant and highly resistant AB predicts a high morbidity and mortality. Hence, the risk factors related to poor outcome in VAP's need to be identified. The implementation of infection control measures, mainly the cross-transmission, may be needed to improve outcome.

#### **Nosocomial sinusitis in intensive care unit patients**

**Author(s):** Titov I.; Grynovska M.; Melnyk S.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: Nosocomial sinusitis (NS) is a complication of critically ill patients which develops 48-72 h after admission and is mostly linked but not limited to such invasive procedures as nasotracheal intubation and nasogastric tube placement. NS is often overlooked as a source of pyrexia of unknown origin, meningeal manifestations, sepsis and ventilator associated pneumonia in ICU patients. CT scanning and sinus puncture are used to confirm the inflammatory process and identify the pathogen behind it. Methods: A retrospective case study of 6.479 ICU patients for a period of 2012-2016 was performed. We have analysed data from the CT scans of paranasal sinuses and bacteriological findings of samples obtained from sinus puncture. Results: 644 (9.9%) patients were suspected of NS on the 5-7th day of stay in the ICU. The CT scan confirmed pathological changes in 464 patients (7.1%). Hemisinusitis was detected in 422 patients (90.9%) and pansinusitis in 41 patients (8.8%). There was also an isolated case of maxillary sinusitis in 1 patient (0.2%). The pathogenic culture was identified only in 297 (64%) samples, 34.6% of which revealed isolated bacteria and 65.4% a polymicrobial association. Gram positive bacteria were detected in 16.1% of cases and Gram negative in 49.5%. Most cases revealed multiple antibiotic resistance. Conclusions: 1. NS has proved to be largely caused by Gram negative bacteria and polymicrobial associations. The use of broad spectrum antibiotics in ICU may justify the presence of sterile cultures. 2. Early identification of risk patients in ICU as well as the use of screening CT scan may benefit timely diagnosis and adequate treatment of patients. 3. Preventive considerations include: patient's bed head elevation, the use of oral gastric tube in sedated and coma patients on ventilation, nasotracheal intubation only if indicated, removal of nasogastric tube at night, proper hygiene.

#### **Pragmatic selective digestive decontamination (SDD): Ventilator-associated pneumonia (VAP) rates & local antibiotic resistance**

**Author(s):** Highgate J.; Kilic J.; Baldwin F.; Rashid A.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: Despite reductions in mortality reported with SDD, concerns about bacterial resistance and alteration of microbiome limit use. A retrospective observational study was conducted into the effect of local SDD protocols on VAP rates and resistance patterns. Over a 2-year period, 2 regimens were used dependent on drug availability and hospital antibiotic stewardship concerns. The study was designed to review practice and identify any risks of partial implementation. Methods: Patients ventilated on a general intensive care were identified via clinical information systems. Three periods were reviewed for adherence to SDD protocols, Pre SDD (Jan - Feb 14), Full (July - Sept 15) and Partial (July - Sept 16). High-risk patients during both SDD periods also received IV antibiotics for 96 hours. Patients admitted with pneumonia or tuberculosis were excluded from VAP analysis. Remaining patients' records were reviewed and the Clinical Pulmonary Infection Score (CPIS) calculated for each ventilated day to identify VAP rates. Positive respiratory microbiological results for all patients admitted to the ICU during each time period were reviewed to assess for wider changes in local resistance patterns. Results: Protocol adherence was assessed in 71 patients during the full SDD period and 70 during the partial (Table 1). The number of patients included for analysis of VAP rates during each period was 38 pre SDD, 50 during full SDD and 37 during partial SDD. There were no significant changes in resistance patterns or *Clostridium difficile* rates (Table 2). Conclusions: Compliance with the available enteral antibiotics was reasonable but with IV antibiotics was poor. It is accepted that alterations and non-adherence to protocols risk development of resistant bacterial strains. Within our unit no decrease in VAP rates was seen but reassuringly no increased rates of extended bacterial resistance were identified during the treatment periods. (Table presented).



### **Targeted surveillance of nosocomial infection in intensive care units of 176 hospitals in Jiangsu province, China.**

**Author(s):** Li, Y.; Cao, X.; Ge, H.; Jiang, Y.; Zhou, H.; Zheng, W.

**Source:** Journal of Hospital Infection; May 2018; vol. 99 (no. 1); p. 36-41

**Publication Type(s):** Academic Journal

**Abstract:**Background: Nosocomial infections (NIs) impact care and costs in hospitals across the globe. There are few data on targeted surveillance of NI in intensive care units (ICUs), and data specific to the risk factors for NI are especially limited. Methods: One hundred and seventy-six secondary and tertiary hospitals performed NI targeted surveillance in their ICUs. The data were collected and summarized by Minke software, then fed back once per quarter. Findings: The incidence of NI appeared to decrease, and the incidence of NI per 1000 patient-days and adjusted incidence were 25.63‰ and 7.41‰ in 2010, and 9.73‰ and 2.76‰ in 2015, respectively. The NI incidence in general hospitals was higher than in specialized hospitals. The incidence of central-line-associated bloodstream infection (CLABSI) and catheter-associated urinary tract infection (CAUTI) appeared to decrease, and the incidence of ventilator-associated pneumonia (VAP) decreased markedly from 20.33‰ to 2.76‰. There was no statistically significant difference among ICUs. The six most frequently found pathogen-caused NIs were *Acinetobacter baumannii* (AB), *Klebsiella pneumoniae* (KP), *Pseudomonas aeruginosa* (PA), *Staphylococcus aureus*, *Candida albicans*, and *Escherichia coli* (E. coli). The isolation rate of carbapenem-resistant Gram-negative bacilli were carbapenem-resistant AB 80.53%, carbapenem-resistant PA 39.94%, carbapenem-resistant KP (CRKP) 24.86%, and carbapenem-resistant E. coli 9.23%. The isolation rate of methicillin-resistant *S. aureus* (MRSA) was 66.30%. The increasing trend of CRKP was statistically significant as analysed by the regression model. Conclusion: The incidences of VAP, CAUTI, and CLABSI were high in ICUs, and multidrug-resistant organisms were the primary pathogens of NI. The implementation of targeted surveillance may determine the risk factors of NI so that effective intervention measures can be taken to reduce the incidence of NI in ICU patients.

### **Nurses' implementation of ventilator-associated pneumonia prevention guidelines: an observational study in Jordan.**

**Author(s):** Aloush, Sami M.

**Source:** Nursing in Critical Care; May 2018; vol. 23 (no. 3); p. 147-151

**Publication Type(s):** Academic Journal

**Abstract:**ABSTRACT: Background: Ventilator-associated pneumonia prevention guidelines from the Center for Disease Control and Prevention, the American Thoracic Society, and the Institute for Health Care and Improvement have been published to reduce the rate of ventilator-associated pneumonia in the clinical settings; however, nurses' compliance with these guidelines is still questionable. Aims: The purpose of this study was to assess nurses' compliance with ventilator-associated pneumonia prevention guidelines and the factors that influence their compliance. Design: A structured observational design with a non-participant approach. Method: One hundred nurses were observed during their care for patients on mechanical ventilator. The observers documented nurses' implementation of ventilator-associated pneumonia prevention guidelines using a structured observational sheet. Results: Compliance of nurses was found to be unsatisfactory. Of the participants, 63% showed 'insufficient compliance'. Nurses working in units with a 1:1 nurse:patient ratio and lower beds' capacity demonstrated higher compliance and their intensive care units had a lower rate of ventilator-associated pneumonia and shorter intensive care unit stay in comparison with their counterparts working with a 1:2 nurse:patient ratio and higher beds' capacity. Conclusion: Nurses' compliance with ventilator-associated pneumonia prevention guidelines was insufficient. Low nurse-patient ratio and large intensive care unit beds capacity were found to affect nurses'

compliance and patients' outcomes. This study expanded knowledge about important aspects of nursing care; nurses' compliance with ventilator-associated pneumonia prevention guidelines and the factors that affect their compliance. This knowledge can be used by health professional to guide the clinical practice and to improve the quality of care.

**Continuous versus intermittent endotracheal cuff pressure control for the prevention of ventilator-associated respiratory infections in Vietnam: study protocol for a randomised controlled trial.**

**Author(s):** Dat, Vu Quoc; Geskus, Ronald B.; Wolbers, Marcel; Loan, Huynh Thi; Yen, Lam Minh;

**Source:** Trials; Apr 2018; vol. 19 (no. 1); p. 1-1

**Publication Date:** Apr 2018

**Publication Type(s):** Academic Journal

Available at [Trials](#) - from PubMed Central

**Abstract:**Background: Ventilator-associated respiratory infection (VARI) comprises ventilator-associated pneumonia (VAP) and ventilator-associated tracheobronchitis (VAT). Although their diagnostic criteria vary, together these are the most common hospital-acquired infections in intensive care units (ICUs) worldwide, responsible for a large proportion of antibiotic use within ICUs. Evidence-based strategies for the prevention of VARI in resource-limited settings are lacking. Preventing the leakage of oropharyngeal secretions into the lung using continuous endotracheal cuff pressure control is a promising strategy. The aim of this study is to investigate the efficacy of automated, continuous endotracheal cuff pressure control in preventing the development of VARI and reducing antibiotic use in ICUs in Vietnam.Methods/design: This is an open-label randomised controlled multicentre trial. We will enrol 600 adult patients intubated for  $\leq 24$  h at the time of enrolment. Eligible patients will be stratified according to admission diagnosis (180 tetanus, 420 non-tetanus) and site and will be randomised in a 1:1 ratio to receive either (1) automated, continuous control of endotracheal cuff pressure or (2) intermittent measurement and control of endotracheal cuff pressure using a manual cuff pressure meter. The primary outcome is the occurrence of VARI, defined as either VAP or VAT during the ICU admission up to a maximum of 90 days after randomisation. Patients in both groups who are at risk for VARI will receive a standardised battery of investigations if their treating physician feels a new infection has occurred, the results of which will be used by an endpoint review committee, blinded to the allocated arm and independent of patient care, to determine the primary outcome. All enrolled patients will be followed for mortality and endotracheal tube cuff-related complications at 28 days and 90 days after randomisation. Other secondary outcomes include antibiotic use; days ventilated, in ICU and in hospital; inpatient mortality; costs of antibiotics in ICU; duration of ICU stay; and duration of hospital stay.Discussion: This study will provide high-quality evidence concerning the use of continuous endotracheal cuff pressure control as a method to reduce VARI, antibiotic use and hospitalisation costs and to shorten stay.Trial Registration: ClinicalTrials.gov, NCT02966392 . Registered on November 9, 2016. Protocol version: 2.0; issue date March 3, 2017.

**Nurses' perception and attitudes towards oral care practices for mechanically ventilated patients.**

**Author(s):** Alja'afreh, Mahmoud A; Mosleh, Sultan M; Habashneh, Sakhaa S

**Source:** Saudi medical journal; Apr 2018; vol. 39 (no. 4); p. 379-385

**Publication Type(s):** Journal Article

Available at [Saudi Medical Journal](#) - from EBSCO (MEDLINE Complete)

**Abstract:**OBJECTIVESTo explore the perception and attitudes of intensive care unit (ICU) nurses towards oral care practice for mechanically ventilated (MV) patients.METHODA descriptive cross-sectional design was used in this study. A convenience sample of 96 ICU nurses completed a

questionnaire on their perception and attitudes towards oral care. The study setting was 3 representative Jordanian hospitals in Al-Karak and the capital, Amman, over a 6-month period between February and September 2016. RESULTS Ninety-six nurses participated in the study. The response rate was 76.8%. The results revealed that 65% only follow a specific oral care protocol. Nurses did not adhere to minimal standards. Although nurses' attitude towards oral care was strongly positive, 68% of them perceived it as an unpleasant task and 29% agreed that they had insufficient training; 78% agreed to learn more about the best way to perform oral care. Standard descriptive statistics were calculated for all baseline information (sociodemographic characteristics). Binary variables were expressed as proportions, and normally distributed continuous variables as means and standard deviations. CONCLUSION The poor perception and attitudes of ICU nurses regarding oral care for MV patients require the urgent attention of clinical administrators. In-hospital training regarding oral care protocol could improve nurses' perception and attitudes.

### **Analysis of ventilator associated pneumonia (VAP) definitions in a burn intensive care unit: Is something missing?**

**Author(s):** Chafin K.N.; Murray S.J.; Cancio L.C.

**Source:** Journal of Burn Care and Research; Apr 2018; vol. 39

**Publication Type(s):** Conference Abstract

**Abstract:** Introduction: Burn patients are at high risk for infection due to cutaneous thermal injury, inhalation injury as well as treatments such as invasive lines and ventilator support. All critically ill burn patients are under routine infection control surveillance and data is reported to NHSN (National Health Safety Network). Ventilator associated pneumonia is a common infection in critically ill burn patients and is reported to NHSN. However, we determined that clinically documented VAP may not meet the definition for NHSN reportable VAP. To evaluate this problem in our patients, we performed a review of patients with VAP definitions from the IDSA (Infectious Diseases Society of America) and ABA (American Burn Association). Methods: We performed a retrospective chart review of all electronic medical records for burn ICU patients for 2016. Review of charts searched for the word VAP. Results: Thirty-one charts were reviewed. Only 6 charts (19%) met the NHSN criteria for VAP. The top five reasons for 25 charts not meeting criteria were no fever, no duration of stability for ventilator settings per NHSN, febrile throughout admission no ventilator changes and instability too soon after intubation. Conclusions: The NHSN and ABA criteria differ, which may result in underreporting of VAP. We should investigate our criteria and find consensus. Applicability of Research to Practice: If it is discovered that there is underreporting of VAP, that could have a negative impact on our patients. If all reporting bodies are underreporting VAP to NHSN, that could misrepresent the true clinical picture and occurrence of VAP.

### **Ventilator-associated pneumonia in patients assisted by veno-arterial extracorporeal membrane oxygenation support: Epidemiology and risk factors of treatment failure**

**Author(s):** Bougle A.; Bomble C.; Margetis D.; Vidal C.; Coroir M.; Amour J.; Lebreton G.; Hajage D.

**Source:** PLoS ONE; Apr 2018; vol. 13 (no. 4)

**Publication Type(s):** Article

Available at [PloS one](#) - from EBSCO (MEDLINE Complete)

**Abstract:** Introduction Ventilator-associated pneumonia (VAP) is frequent in Intensive Care Unit (ICU) patients. In the specific case of patients treated with Veno-Arterial Extracorporeal Membrane Oxygenation Support (VA-ECMO), VAP treatment failures (VAP-TF) have been incompletely investigated. Methods To investigate the risk factors of treatment failure (VAP-TF) in a large cohort of ICU patients treated with VA-ECMO, we conducted a retrospective study in a Surgical ICU about patients assisted with VA-ECMO between January 1, 2013, and December 31, 2014. Diagnosis of VAP

was confirmed by a positive quantitative culture of a respiratory sample. VAP-TF was defined as composite of death attributable to pneumonia and relapse within 28 days of the first episode. Results In total, 152 patients underwent ECMO support for > 48h. During the VA-ECMO support, 85 (55.9%) patients developed a VAP, for a rate of 60.6 per 1000 ECMO days. The main pathogens identified were *Pseudomonas aeruginosa* and Enterobacteriaceae. VAP-TF occurred in 37.2% of patients and was associated with an increased 28-day mortality (Hazard Ratio 3.05 [1.66; 5.63],  $P < 0.001$ ), and VA-ECMO assistance duration (HR 1.47 [1.05-2.05],  $P = 0.025$ ). Risk factors for VAP-TF were renal replacement therapy (HR 13.05 [1.73; 98.56],  $P = 0.013$ ) and documentation of *Pseudomonas aeruginosa* (HR 2.36 [1.04; 5.35],  $P = 0.04$ ). Conclusions VAP in patients treated with VA-ECMO is associated with an increased morbidity and mortality. RRT and infection by *Pseudomonas aeruginosa* appear as strong risks factors of treatment failure. Further studies seem necessary to precise the best antibiotic management in these patients. Copyright © 2018 Bougle et al. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### **Tuberculosis on the intensive care unit.**

**Author(s):** Passi, Neha N.; Buckley, Jim

**Source:** British Journal of Hospital Medicine (17508460); Mar 2018; vol. 79 (no. 3); p. 142-147

**Publication Type(s):** Academic Journal

**Abstract:**Patients with tuberculosis admitted to the intensive care unit represent a small (1-3%) yet significant subset of the global tuberculosis burden. This article reviews current evidence supporting the diagnosis and management of patients with tuberculosis admitted to an intensive care unit from a combination of cohort studies and national and international tuberculosis guidelines. This review considers admission, diagnosis, mechanical ventilation, infection control, treatment and prognosis of patients with tuberculosis admitted to an intensive care unit. It highlights both diagnostic and management challenges and areas where ambiguity remains and further evidence is required.

### **Multi-drug resistant ventilator associated pneumonia: risk factors and outcomes.**

**Author(s):** Hosamirudsari, Hadiseh; Forghani, Sina; Akbarpour, Samaneh

**Source:** Canadian Journal of Infection Control; Mar 2018; vol. 33 (no. 1); p. 20-24

**Publication Type(s):** Academic Journal

Available at [Canadian Journal of Infection Control](#) - from EBSCO (CINAHL Plus with Full Text)

**Abstract:**Background: Multi-drug resistant (MDR) ventilator associated pneumonia (VAP) may lead to inappropriate empiric antimicrobial treatment and poor outcomes. The purpose of this study was to investigate MDR pathogens' effect on the VAP patients in order to improve the treatment choice and outcome. Methods: We retrospectively studied a collection of 132 VAP patients that confirmed the characteristics, risk factors and outcomes of pneumonia. MDR VAP patients were also compared with non-MDR VAP patients. Results: MDR and non-MDR pathogens were found in 96 (72.7%) and 36 (27.3%) of the patients, respectively. The most common organism was *Klebsiella pneumoniae* and the most fatal MDR pathogen was *Staphylococcus aureus*. The MDR VAP was found to be associated with an increased length of stay in intensive care unit (ICU), increased hospital stay, and longer intubation time. No statistically significant association was found between prior antimicrobial use and MDR-VAP. The mortality rate of MDR VAPs was significantly higher than non-MDR VAPs. Conclusion: Discharging patients from ICU and hospital and extubation of the patients as early as possible are two important interventions for prevention of MDR-VAP. Regarding prior antimicrobial use, no significant difference was observed between MDR and non-MDR VAPs. Administration of

empiric antibiotic therapy seems to have a protective effect, decreasing mortality without evidence of contributing to multi-drug resistance.

**The barriers to the prevention of ventilator-associated pneumonia from the perspective of critical care nurses: A qualitative descriptive study.**

**Author(s):** Atashi, Vajihe; Yousefi, Hojatollah; Mahjobipoor, Hosein; Yazdannik, Ahmadreza

**Source:** Journal of Clinical Nursing; Mar 2018; vol. 27 (no. 5/6)

**Publication Type(s):** Academic Journal

**Abstract:** Aims and objectives: The aim of this study was to explore the perspectives of Iranian critical care nurses on the barriers to ventilator-associated pneumonia prevention in intensive care units. Background: Most patients hospitalized in intensive care units need mechanical ventilation. One of the most prevalent and serious complications of mechanical ventilation is ventilator-associated pneumonia. There are different barriers to the prevention of this kind of pneumonia. Design: Qualitative descriptive design was used. Methods: In this qualitative study, 23 critical care nurses were recruited via purposive sampling. Semi-structured interviews were done for data collection. The interviews were recorded digitally, transcribed word by word, and analyzed using the inductive content analysis approach. Results: The barriers to the prevention of ventilator-associated pneumonia fell into three main categories, namely nurses' limited professional competence, unfavorable environmental conditions, and passive human resource management. The 10 subcategories of these main categories were unfavorable professional attitude, limited professional knowledge, low job motivation, limited professional accountability, non-standard physical structure, inadequate or inappropriate equipment, heavy workload, staff shortage, inadequate staff training, and ineffective supervision. Conclusion: The barriers to the prevention of ventilator-associated pneumonia in intensive care units are very diverse and complex and include a wide range of interrelated personal, environmental, and organizational barriers. Relevance to clinical practice: This study created a better understanding of the barriers to ventilator-associated pneumonia prevention. Moreover, highlighted the importance of sufficient resources, adequate staffing level, and contextually-appropriate evidence-based guidelines for effective ventilator-associated pneumonia prevention.

**Education on invasive mechanical ventilation involving intensive care nurses: a systematic review.**

**Author(s):** Guilhermino, Michelle C; Inder, Kerry J; Sundin, Deborah

**Source:** Nursing in critical care; Mar 2018

**Publication Type(s):** Journal Article Review

**Abstract:** BACKGROUND Intensive care unit nurses are critical for managing mechanical ventilation. Continuing education is essential in building and maintaining nurses' knowledge and skills, potentially improving patient outcomes. AIM The aim of this study was to determine whether continuing education programmes on invasive mechanical ventilation involving intensive care unit nurses are effective in improving patient outcomes. METHODS Five electronic databases were searched from 2001 to 2016 using keywords such as mechanical ventilation, nursing and education. Inclusion criteria were invasive mechanical ventilation continuing education programmes that involved nurses and measured patient outcomes. Primary outcomes were intensive care unit mortality and in-hospital mortality. Secondary outcomes included hospital and intensive care unit length of stay, length of intubation, failed weaning trials, re-intubation incidence, ventilation-associated pneumonia rate and lung-protective ventilator strategies. Studies were excluded if they excluded nurses, patients were ventilated for less than 24 h, the education content focused on protocol implementation or oral care exclusively or the outcomes were participant satisfaction. Quality was assessed by two reviewers using an education intervention critical appraisal worksheet and a risk of bias assessment tool. Data were extracted independently by two reviewers and

analysed narratively due to heterogeneity. **RESULT** Twelve studies met the inclusion criteria for full review: 11 pre- and post-intervention observational and 1 quasi-experimental design. Studies reported statistically significant reductions in hospital length of stay, length of intubation, ventilator-associated pneumonia rates, failed weaning trials and improvements in lung-protective ventilation compliance. Non-statistically significant results were reported for in-hospital and intensive care unit mortality, re-intubation and intensive care unit length of stay. **CONCLUSION** Limited evidence of the effectiveness of continuing education programmes on mechanical ventilation involving nurses in improving patient outcomes exists. Comprehensive continuing education is required. **RELEVANCE TO CLINICAL PRACTICE** Well-designed trials are required to confirm that comprehensive continuing education involving intensive care nurses about mechanical ventilation improves patient outcomes.

**Efficacy of continuous versus intermittent subglottic secretion drainage in preventing ventilator-associated pneumonia in patients requiring mechanical ventilation: A single-center randomized controlled trial.**

**Author(s):** Fujimoto, Hiroko; Yamaguchi, Osamu; Hayami, Hajime; Shimosaka, Mika; Tsuboi, Sayaka

**Source:** Oncotarget; Mar 2018; vol. 9 (no. 22); p. 15876-15882

**Publication Type(s):** Journal Article

Available at [Oncotarget](#) - from PubMed Central

**Abstract:** Objective Aspiration of subglottic secretion is a widely used intervention to prevent ventilator-associated pneumonia (VAP). This study aimed to compare the efficacy of continuous and intermittent subglottic secretion drainage (SSD) in preventing VAP. **Methods** A single-center randomized controlled trial was conducted on adult postoperative patients who were expected to undergo mechanical ventilation for more than 48 hours. Primary outcome measure was incidence of VAP and secondary outcome measures were length of mechanical ventilation and intensive-care unit (ICU) stay. **Results** Fifty-nine patients received continuous SSD, while 60 patients received intermittent SSD. Of these 119 patients, 88 (74%) were excluded and 15 and 16 patients were allocated to receive continuous and intermittent SSD, respectively. VAP was detected in 4 (26.7%) and 7 (43.8%) patients in the continuous and intermittent groups, respectively, ( $p=0.320$ ). The length of mechanical ventilation was significantly shorter ( $p=0.034$ ) in the continuous group ( $99.5\pm 47.1$  h) than in the intermittent group ( $159.9\pm 94.5$  h). The length of ICU stay was also shorter ( $p=0.0097$ ) in the continuous group ( $6.3\pm 2.1$  days) than the intermittent group ( $9.8\pm 4.8$  days). **Conclusions** Although continuous SSD did not reduce the incidence of VAP, it reduced the length of mechanical ventilation and ICU stay when compared to intermittent SSD.

**Critical care nurses' knowledge of, adherence to, and barriers toward institution-specific ventilator bundle.**

**Author(s):** Jansson, Miia M; Syrjälä, Hannu P; Talman, Kirsi; Meriläinen, Merja H; Ala-Kokko, Tero I

**Source:** American journal of infection control; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:** **BACKGROUND** Although evidence-based practices are known to improve the quality of care, making it cost-efficient and improving clinical results, barriers to transferring research into clinical practice have hindered this process. **AIM** To evaluate critical care nurses' knowledge of, adherence to, and barriers toward institution-specific ventilator bundle. **MATERIAL AND METHODS** In 2015, we conducted an institution-specific, cross-sectional study in a 26-bed adult mixed medical-surgical intensive care unit (ICU) in Finland using quantitative survey of knowledge and self-reported adherence with qualitative gathering of barrier data. A pre-validated multiple-choice Ventilator Bundle Questionnaire was distributed to all registered nurses who were direct care providers ( $n = 155$ ). **RESULT** The final response rate was 55.5% ( $n = 86$ ), and 47.2% ( $n = 34$ ) of respondents had

more than 10 years of ICU experience. The levels of knowledge and self-reported adherence were 71.1% and 65.8% of the total score, respectively. The level of knowledge was higher among respondents who had received in-service education about ventilator bundle compared with respondents who had not received in-service education (27.0 vs 24.0 [P = .012]). Less experienced nurses reported significantly higher adherence than nurses with more ICU experience (29.0 vs 25.0 [P = .034]). The correlation between knowledge and adherence scores was low ( $\rho$  0.48 [P < .001]). The most well-known and adhered-to guidelines described patient positioning, daily chlorhexidine-based oral care, and strict hand hygiene. The least-known guidelines and those least adhered to described respiratory equipment, management of sedation and analgesia, and practices prior to and during endotracheal suctioning. The main barriers were related to the nurse respondents (e.g., lack of education [25.9%]), environment (e.g., role ambiguities [36.4%] and inadequate resources [21.1%]), and patients (e.g., patient discomfort [4.8%] and fear of adverse effects [4.6%]). CONCLUSIONS Self-reported adherence did not correlate with knowledge and was not related to work experience. Most of the barriers toward evidence-based guidelines indicated a need for changes that are beyond the control of individual nurses.

### **Impact of immunosuppression on incidence, aetiology and outcome of ventilator-associated lower respiratory tract infections.**

**Author(s):** Moreau, Anne-Sophie; Martin-Loeches, Ignacio; Povoas, Pedro; Salluh, Jorge

**Source:** The European respiratory journal; Mar 2018; vol. 51 (no. 3)

**Publication Type(s):** Journal Article

**Abstract:** The aim of this planned analysis of the prospective multinational TAVeM database was to determine the incidence, aetiology and impact on outcome of ventilator-associated lower respiratory tract infections (VA-LRTI) in immunocompromised patients. All patients receiving mechanical ventilation for >48 h were included. Immunocompromised patients (n=663) were compared with non-immunocompromised patients (n=2297). The incidence of VA-LRTI was significantly lower among immunocompromised than among non-immunocompromised patients (16.6% versus 24.2%; sub-hazard ratio 0.65, 95% CI 0.53-0.80; p<0.0001). Similar results were found regarding ventilator-associated tracheobronchitis (7.3% versus 11.6%; sub-hazard ratio 0.61, 95% CI 0.45-0.84; p=0.002) and ventilator-associated pneumonia (9.3% versus 12.7%; sub-hazard ratio 0.72, 95% CI 0.54-0.95; p=0.019). Among patients with VA-LRTI, the rates of multidrug-resistant bacteria (72% versus 59%; p=0.011) and intensive care unit mortality were significantly higher among immunocompromised than among non-immunocompromised patients (54% versus 30%; OR 2.68, 95% CI 1.78-4.02; p<0.0001). In patients with ventilator-associated pneumonia, mortality rates were higher among immunocompromised than among non-immunocompromised patients (64% versus 34%; p<0.001). Incidence of VA-LRTI was significantly lower among immunocompromised patients, but it was associated with a significantly higher mortality rate. Multidrug-resistant pathogens were more frequently found in immunocompromised patients with VA-LRTI.

### **Serum and alveolar procalcitonin had a weak diagnostic value for ventilator-associated pneumonia in patients with pulmonary infection score $\geq$ 6.**

**Author(s):** Shokri, Mehran; Ghasemian, Roya; Bayani, Masomeh; Maleh, Parviz Amri

**Source:** Romanian journal of internal medicine = Revue roumaine de medecine interne; Mar 2018; vol. 56 (no. 1); p. 9-14

**Publication Type(s):** Journal Article

Available at [Romanian Journal of Internal Medicine](#) - from International DOI Foundation

**Abstract:** BACKGROUND Measuring the serum and alveolar procalcitonin level as inflammatory marker in the diagnosis of ventilator-associated pneumonia (VAP) has been taken into account. In

this study, serum and alveolar procalcitonin levels in patients with suspected VAP and patients with confirmed VAP were compared. **METHODS** This cross-sectional study was conducted using 50 intubated intensive care unit (ICU) patients, connected to ventilator, from October 2014 to April 2015. 50 patients with clinical pulmonary infection score  $\geq 6$  were divided into two groups. Patients whose bronchoalveolar lavage (BAL) has shown the growth of more than 104 CFU/mL were included in confirmed VAP group and other patients were included in suspected VAP group. Serum and alveolar procalcitonin levels were measured and compared between both groups. **RESULTS** Mean age of patients was  $69.10 \pm 42.13$  with a range of 16-90 years, out of which 23 patients were male (46%) and 27 patients were female (54%). Moreover, patients' mean clinical pulmonary infection score was reported to be  $7.02 \pm 1.07$ . There was a significant relationship between serum and alveolar procalcitonin in suspected patients and patients with an approved form of pneumonia ( $p = 0.001$  and  $0.027$ ). Area under the curve for alveolar procalcitonin was 0.683 (sensitivity = 57%; specificity = 80%) and for serum procalcitonin 0.751 (sensitivity = 71%; specificity = 73%) for the diagnosis of VAP. **CONCLUSION** According to the results of the present study, we can diagnose ventilator-associated pneumonia earlier and more accurately by measuring procalcitonin level (particularly alveolar type) in intensive care unit patients.

### **Novel pharmacotherapy for the treatment of hospital-acquired and ventilator-associated pneumonia caused by resistant gram-negative bacteria.**

**Author(s):** Kidd, James M; Kuti, Joseph L; Nicolau, David P

**Source:** Expert opinion on pharmacotherapy; Mar 2018; vol. 19 (no. 4); p. 397-408

**Publication Type(s):** Journal Article

**Abstract:** **INTRODUCTION** Hospital-acquired and ventilator-associated bacterial pneumonia (HABP/VABP) are among the most prevalent infections in hospitalized patients, particularly those in the intensive care unit. Importantly, the frequency of multidrug resistant (MDR) Gram-negative (GN) bacteria as the bacteriologic cause of HABP/VABP is increasing. These include MDR *Pseudomonas aeruginosa*, *Acinetobacter baumannii*, and carbapenem resistant Enterobacteriaceae (CRE). Few antibiotics are currently available when such MDR Gram-negatives are encountered and older agents such as polymyxin B, colistin (polymyxin E), and tigecycline have typically performed poorly in HABP/VABP. **Areas covered:** In this review, the authors summarize novel antibiotics which have reached phase 3 clinical trials including patients with HABP/VABP. For each agent, the spectrum of activity, pertinent pharmacological characteristics, clinical trial data, and potential utility in the treatment of MDR-GN HABP/VABP is discussed. **Expert opinion:** Novel antibiotics currently available, and those soon to be, will expand opportunities to treat HABP/VABP caused by MDR-GN organisms and minimize the use of more toxic, less effective drugs. However, with sparse clinical data available, defining the appropriate role for each of the new agents is challenging. In order to maximize the utility of these antibiotics, combination therapy and the role of therapeutic drug monitoring should be investigated.

### **Complications and Pharmacologic Interventions of Invasive Positive Pressure Ventilation During Critical Illness**

**Author(s):** Newsome A.S.; Chastain D.B.; Hawkins W.A.; Watkins P.

**Source:** Journal of Pharmacy Technology; Mar 2018

**Publication Type(s):** Article In Press

**Abstract:** **Objective:** To review the fundamentals of invasive positive pressure ventilation (IPPV) and the common complications and associated pharmacotherapeutic management in order to provide opportunities for pharmacists to improve patient outcomes. **Data Sources:** A MEDLINE literature search (1950-December 2017) was performed using the key search terms invasive positive pressure ventilation, mechanical ventilation, pharmacist, respiratory failure, ventilator associated organ



dysfunction, ventilator associated pneumonia, ventilator bundles, and ventilator liberation. Additional references were identified from a review of literature citations. Study Selection and Data Extraction: All English-language original research and review reports were evaluated. Data Synthesis: IPPV is a common supportive care measure for critically ill patients. While lifesaving, IPPV is associated with significant complications including ventilator-associated pneumonia, sinusitis, organ dysfunction, and hemodynamic alterations. Optimization of pain and sedation management provides an opportunity for pharmacists to directly affect IPPV exposure. A number of pharmacotherapeutic interventions are related directly to prophylaxis against IPPV-associated adverse events or aimed at reduction of duration of IPPV. Conclusions: Enhanced knowledge of the common complications, associated pharmacotherapy, and monitoring strategies facilitate the pharmacist's ability to provide increased pharmacotherapeutic insight in a multidisciplinary intensive care unit setting. Copyright © 2018, The Author(s) 2018.

## Kidney or Renal

### **Association of pain in the critically ill patient with acute kidney injury risk in the intensive care unit (ICU)**

**Author(s):** Vieira J.M.; Herranz L.B.; De Azevedo L.C.P.; Castro I.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:** Introduction: In critically ill patients, occurrence of pain is frequent and usually correlates with worse outcomes, such as prolonged ICU length of stay (LOS) and mechanical ventilation. In this regard, pain leads to sympathetic activation, inflammatory mediators and therefore, potentially to organ dysfunction. The aim of this study is to evaluate the relationship between acute pain in critically ill patients and their association with acute kidney injury (AKI). Methods: Retrospective cohort with 6345 adults patients admitted between June 2013 and June 2016, from the ICU of Hospital Sirio Libanes Hospital in Sao Paulo (Brazil). Main exclusion criteria were: length of stay < 48h, coma and previous AKI. The predictor pain was obtained through daily electronic records according to numerical verbal scale (0-10). The outcome was defined as serum creatinine elevation equal to or greater than 0.3mg/dl and/or greater than 50% increase at any time after the first 48 hours in the ICU. The multivariate analysis was performed by Binary Logistic Regression through distinct groups of early or late predictive factors in relation to AKI. Results: After the exclusion of 3220 patients, the incidence of pain with numerical verbal scale equal to or greater than 3 points was 23.6%. The outcome occurred in 31.7% of the cohort. In the binary regression, using the more early predictive factors, sex and pain presented independent relation with the outcome - adjusted OR 1.24 (1.12-1.36) and 1.63 (1.34-1.98), respectively ( $p < 0.001$ ). In the analysis of late association factors, mechanical ventilation over 3 days - OR 4.71 (3.01-7.36), use of strong opioid - OR 2.7 (1.58-4.60) and PCR- t over 5.2mg/dl - OR 2.27 (1.15-4.47) presented the highest positive association with AKI ( $p < 0, 001$ ). Conclusions: Poor management of ICU pain is associated to worse outcomes, including increased risk to AKI. The search for a better pain management strategy in the ICU scenario should therefore be reinforced.

### **Intensive care unit physician-delivered point of care renal tract ultrasound in acute kidney injury is feasible**

**Author(s):** Parulekar P.; Neil-Gallacher E.; Harrison A.

**Source:** Journal of the Intensive Care Society; 2018

**Publication Type(s):** Article In Press

**Abstract:** Acute kidney injury is common in critically ill patients, with ultrasound recommended to exclude renal tract obstruction. Intensive care unit clinicians are skilled in acquiring and interpreting ultrasound examinations. Intensive Care Medicine Trainees wish to learn renal tract ultrasound. We sought to demonstrate that intensive care unit clinicians can competently perform renal tract ultrasound on critically ill patients. Thirty patients with acute kidney injury were scanned by two intensive care unit physicians using a standard intensive care unit ultrasound machine. The archived images were reviewed by a Radiologist for adequacy and diagnostic quality. In 28 of 30 patients both kidneys were identified. Adequate archived images of both kidneys each in two planes were possible in 23 of 30 patients. The commonest reason for failure was dressings and drains from abdominal surgery. Only one patient had hydronephrosis. Our results suggest that intensive care unit clinicians can provide focussed renal tract ultrasound. The low incidence of hydronephrosis has implications for delivering the Core Ultrasound in Intensive Care competencies. Copyright © 2018, The Intensive Care Society 2018.

### **Fluid accumulation during acute kidney injury in the intensive care unit**

**Author(s):** Berthelsen R.E.; Bestle M.H.; Perner A.; Jensen A.K.; Jensen J.-U.

**Source:** Acta Anaesthesiologica Scandinavica; 2018

**Publication Type(s):** Article In Press

**Abstract:** Introduction: Fluid therapy is a ubiquitous intervention in patients admitted to the intensive care unit, but positive fluid balance may be associated with poor outcomes and particular in patients with acute kidney injury. Studies describing this have defined fluid overload either at specific time points or considered patients with a positive mean daily fluid balance as fluid overloaded. We wished to detail this further and performed joint model analyses of the association between daily fluid balance and outcome represented by mortality and renal recovery in patients admitted with acute kidney injury. Method: We did a retrospective cohort study of patients admitted to the intensive care unit with acute kidney injury during a 2-year observation period. We used serum creatinine measurements to identify patients with acute kidney injury and collected sequential daily fluid balance during the first 5 days of admission to the intensive care unit. We used joint modelling techniques to correlate the development of fluid overload with survival and renal recovery adjusted for age, gender and disease severity. Results: The cohort contained 863 patients with acute kidney injury of whom 460 (53%) and 254 (29%) developed 5% and 10% fluid overload, respectively. We found that both 5% and 10% fluid overload was correlated with reduced survival and renal recovery. Conclusion: Joint model analyses of fluid accumulation in patients admitted to the intensive care unit with acute kidney injury confirm that even a modest degree of fluid overload (5%) may be negatively associated with both survival and renal recovery. Copyright © 2018 The Acta Anaesthesiologica Scandinavica Foundation.

### **Hyperchloraemia is associated with acute kidney injury and mortality in the critically ill: A retrospective observational study in a multidisciplinary intensive care unit**

**Author(s):** de Vasconcellos K.; Skinner D.L.

**Source:** Journal of Critical Care; Jun 2018; vol. 45 ; p. 45-51

**Publication Type(s):** Article

**Abstract:** Purpose: The aim of this study was to determine whether serum chloride and changes in serum chloride over time were associated with acute kidney injury (AKI) or intensive care unit (ICU) mortality in a heterogenous critically ill population. Materials and methods: The study was a retrospective observational study of 250 adult patients admitted to a multidisciplinary academic ICU. Serum chloride within 48 h of admission, changes in chloride, and other biochemical and clinical parameters were evaluated as predictors of AKI and mortality. Results: Hyperchloraemia occurred in 143 (57.2%) patients within 48 h of ICU admission. Hyperchloraemia at 48 h was significantly

associated with AKI, OR = 6.44 (95% CI 2.95-14.10) and mortality, OR = 2.46 (95% CI 1.22-4.94) on univariate analysis, with this association persisting on multivariable analysis. An increase in serum chloride was also associated with a significantly increased risk of AKI and mortality on univariate analysis. Hyperchloraemia on admission was, however, not associated with AKI or death. Of the 150 patients with AKI, 147 (98.0%) had developed AKI by 48 h. Conclusions: Hyperchloraemia and increasing serum chloride are associated with adverse outcomes in critically ill patients. There is equipoise as to whether this represents an association, an epiphenomenon or causation. Copyright © 2018 Elsevier Inc.

### **Modest Impact of Serial Measurements of Acute Kidney Injury Biomarkers in an Adult Intensive Care Unit**

**Author(s):** Isshiki R.; Sumida M.; Hamasaki Y.; Nangaku M.; Noiri E.; Asada T.; Doi K.

**Source:** Nephron; Apr 2018

**Publication Type(s):** Article In Press

**Abstract:**Background/Aims: Acute kidney injury (AKI) biomarkers have been developed with the aim of being able to detect kidney damage earlier than the detection process based on serum creatinine levels. However, single time-point measurements appear to furnish insufficient information for detecting and predicting AKI in intensive care unit patients who are frequently affected by multiple and transient/persistent renal insults. We evaluated whether serial measurements enable the prediction of AKI outcomes in such patients. Methods: Serial measurements of AKI biomarkers, including plasma and urinary neutrophil gelatinase-associated lipocalin, urinary L-type fatty acid-binding protein, and urinary N-acetyl-beta-D-glucosaminidase, at intensive care unit (ICU) admission (d1) and 24 h later (d2) were performed for critically ill adult patients in a mixed ICU. We assessed whether each biomarker could predict newly developed AKI, recovery from AKI, worsening of AKI, and hospital mortality. Results: Among the enrolled 272 patients, 33 were determined to show newly developed AKI after ICU admission, 58 showed worsening of AKI, 57 recovered from AKI, and 38 died in the hospital. ROC analysis showed that biomarkers at day 2 provided no significant additional benefit in predicting the above-mentioned AKI outcomes compared with those at day 1. However, net reclassification improvement analysis demonstrated that adding day 2 biomarkers to the clinical model comprising clinical variables along with day 1 biomarkers significantly improved the prediction of these AKI outcomes. Conclusion: Serial measurement of AKI biomarkers used in clinical models could contribute to the prediction of AKI outcomes in a heterogeneous cohort of adult mixed ICU patients, although its reliability seemed to be modest. Copyright © 2018 S. Karger AG, Basel

### **Predictors of Mortality in Acute Kidney Injury Patients Admitted to Medicine Intensive Care Unit in a Rural Tertiary Care Hospital.**

**Author(s):** Saxena, Amrith; Meshram, Shrikant V.

**Source:** Indian Journal of Critical Care Medicine; Apr 2018; vol. 22 (no. 4); p. 231-237

**Publication Type(s):** Academic Journal

Available at [Indian Journal of Critical Care Medicine](#) - from Europe PubMed Central - Open Access

**Abstract:**Background: Acute kidney injury (AKI) is a challenging problem faced by intensive care clinicians worldwide, and it is associated with high morbidity and mortality, especially in critically ill patients. Materials and Methods: A hospital-based prospective, observational study was conducted in patients of AKI admitted to the Intensive Care Unit (ICU) of the Department of Medicine in a rural tertiary care hospital located in central India. Data of all consecutive AKI inpatients related to demographic variables, clinical profile, and laboratory investigations were collected from patient's medical records. Results: Of the total 229 AKI patients enrolled in this study, 65 (28.4%) patients died

during their hospital stay. The presence of metabolic acidosis, hypotension, Glasgow coma scale (GCS) and Acute Physiologic Assessment and Chronic Health Evaluation (APACHE 2) score, advanced AKI stage, higher serum creatinine and blood urea levels on diagnosis of AKI and the peak rise in their level within 48 h of diagnosis of AKI, the use of mechanical ventilator, leukocytosis, and hyperkalemia were significantly associated with in-hospital mortality in AKI patients ( $P < 0.05$ ). Conclusion: The overall in-hospital mortality in patients of AKI admitted to medicine-ICU was 28.4%. Sepsis was the most common cause of AKI (24.5%). The presence of metabolic acidosis, hypotension, GCS and APACHE 2 score, advanced AKI stage, higher serum creatinine, and blood urea levels on diagnosis of AKI and the peak rise in their level within 48 h of diagnosis of AKI, use of mechanical ventilator, leukocytosis, and hyperkalemia were associated with in-hospital mortality in AKI patients.

### **Current practice of diagnosis and management of acute kidney injury in intensive care unit in resource limited settings.**

**Author(s):** Srisawat, Nattachai; Sintawichai, Nattaya; Kulvichit, Win; Lumlertgul, Nuttha;

**Source:** Journal of critical care; Apr 2018; vol. 46 ; p. 44-49

**Publication Type(s):** Journal Article

**Abstract:** PURPOSE In a resource limited settings, there is sparse information about the management of acute kidney injury (AKI) based on systemic data collection. This survey aimed to described the current management of AKI in intensive care units (ICUs) across Thailand. MATERIALS AND METHODS Questionnaires were distributed to 160 physicians involved in the intensive care between January and December 2014 across Thailand. Distribution was done through an online survey platform or telephone interview. RESULT The response rate was 80.6% (129 physicians). AKI diagnosis was mostly made by using KDIGO criteria (36.7%). A common diagnostic investigation of AKI was urinalysis (86%). Nephrologists had a major role (86.4%) in deciding the initiation and selection of renal replacement therapy (RRT) modality. Intermittent hemodialysis is the preferable mode of RRT (72.0%), followed by continuous renal replacement therapy (CRRT, 12%), sustained low efficiency dialysis (10.0%) and peritoneal dialysis (6.0%). Catheter insertion was predominantly performed by nephrologist (51.1%) with ultrasound guidance. The right internal jugular vein was the most common site of insertion (70.4%). The most common indication for CRRT was hemodynamic instability. CONCLUSION Amid increasing concern of AKI in the ICU, our study provides the insight into the management of AKI in resource limited settings.

### **Urinary potassium excretion and its association with acute kidney injury in the intensive care unit.**

**Author(s):** Burns, Alasdair R; Ho, Kwok M

**Source:** Journal of critical care; Apr 2018; vol. 46 ; p. 58-62

**Publication Type(s):** Journal Article

**Abstract:** PURPOSE Using urinary indices as a quick bedside test to assist management of oliguria and acute kidney injury (AKI) has long been sought. This study assessed whether urinary potassium excretion is related to simultaneously calculated creatinine clearance (CrCl) and can predict AKI in the critically ill. MATERIALS AND METHODS In this prospective cohort study, the correlation between 2-h urinary potassium excretion and simultaneously calculated CrCl of 61 critically ill patients was assessed by Pearson's correlation coefficient, and their ability to predict AKI ( $\geq$ stage 1 KDIGO) in the subsequent 7 days was assessed by area under the receiver-operating-characteristic (AUROC) curve. RESULTS Urinary potassium excretion (median 6.2 mmol, range 0.8-24.3) correlated linearly with CrCl (correlation coefficient: 0.58, 95% confidence interval [CI] 0.38-0.72;  $p = 0.001$ ), and had a moderate ability to predict subsequent AKI ( $n = 19$  [31%]; AUROC 0.747, 95%CI 0.620-0.850;  $p = 0.001$ ), especially in patients without prior exposure to furosemide within 24-h (correlation coefficient 0.61, 95%CI 0.41-0.76; AUROC 0.789, 95%CI 0.654-0.890;  $p = 0.001$ , respectively). CONCLUSION Urinary potassium excretion correlates with CrCl and predicts AKI in the

critically ill without recent furosemide exposure. Given 2-h urinary potassium excretion can be measured easily, its potential as a marker of renal function deserves further study.

## Delirium and Sleep Deprivation

### **Predisposing factors, clinical assessment, management and outcomes of agitation in the trauma intensive care unit**

**Author(s):** Mahmood S.; Al-Thani H.; Mahmood O.; El-Menyar A.; Asim M.

**Source:** World Journal of Emergency Medicine; 2018; vol. 9 (no. 2); p. 105-112

**Publication Type(s):** Article

Available at [World Journal of Emergency Medicine](#) - from Europe PubMed Central - Open Access

**Abstract:**BACKGROUND: Agitation occurs frequently among critically ill patients admitted to the intensive care unit (ICU). We aimed to evaluate the frequency, predisposing factors and outcomes of agitation in trauma ICU. METHODS: A retrospective analysis was conducted to include patients who were admitted to the trauma ICU between April 2014 and March 2015. Data included patient's demographics, initial vitals, associated injuries, Ramsey Sedation Scale, Glasgow Coma Scale, head injury lesions, use of sedatives and analgesics, head interventions, ventilator days, and ICU length of stay. Patients were divided into two groups based on the agitation status. RESULTS: A total of 102 intubated patients were enrolled; of which 46 (45%) experienced agitation. Patients in the agitation group were 7 years younger, had significantly lower GCS and sustained higher frequency of head injuries ( $P>0.05$ ). Patients who developed agitation were more likely to be prescribed propofol alone or in combination with midazolam and to have frequent ICP catheter insertion, longer ventilatory days and higher incidence of pneumonia ( $P>0.05$ ). On multivariate analysis, use of propofol alone (OR=4.97; 95% CI=1.35-18.27), subarachnoid hemorrhage (OR=5.11; 95% CI=1.38-18.91) and ICP catheter insertion for severe head injury (OR=4.23; 95% CI=1.16-15.35) were independent predictors for agitation ( $P>0.01$ ). CONCLUSION: Agitation is a frequent problem in trauma ICU and is mainly related to the type of sedation and poor outcomes in terms of prolonged mechanical ventilation and development of nosocomial pneumonia. Therefore, understanding the main predictors of agitation facilitates early risk-stratification and development of better therapeutic strategies in trauma patients. Copyright © 2017 World Journal of Emergency Medicine.

### **Comparison of Ketamine- Versus Nonketamine-Based Sedation on Delirium and Coma in the Intensive Care Unit**

**Author(s):** Shurtleff V.; Radosevich J.J.; Patanwala A.E.

**Source:** Journal of Intensive Care Medicine; 2018

**Publication Type(s):** Article In Press

**Abstract:**Background: At this time, there are no studies evaluating the risk of delirium or coma with the use of ketamine in mechanically ventilated adult patients, compared to conventional therapies such as propofol or dexmedetomidine. Objective: The objective of this study was to evaluate the number of days alive without delirium or coma in mechanically ventilated patients in the intensive care unit receiving analgosedation infusions with ketamine versus without ketamine. Methods: This was a retrospective cohort study conducted at an academic medical center in the United States. Consecutive mechanically ventilated adult patients between November 2015 and April 2017 were evaluated. Patients were divided into 2 groups based on the sedative regimen used: ketamine based or nonketamine based. The primary outcome was the number of days alive without delirium or coma. The secondary outcomes were incidence of delirium, incidence of coma, and ventilator-free days at day 28. Results: The study cohort consisted of 79 patients, of which 39 received ketamine-

and 40 received nonketamine-based sedation. The number of days alive without delirium or coma was 6 days (interquartile range [IQR]: 2-9 days) with ketamine and 4 days (IQR: 3-7 days) with nonketamine ( $P = .351$ ). Delirium occurred in 29 (74%) of 39 patients with ketamine and 34 (85%) of 40 patients with nonketamine ( $P = .274$ ). Coma occurred in 16 (41%) of 39 patients with ketamine and 6 (15%) of 40 patients with nonketamine ( $P = .013$ ). The median ventilator-free days were 13 days (IQR: 0-23 days) with ketamine and 21 days (0-25 days) with nonketamine ( $P = .229$ ). Conclusions: Sustained ketamine-based sedation in mechanically ventilated patients may be associated with a higher rate of observed coma but similar delirium- and coma-free days compared nonketamine-based regimens. Copyright © 2018, The Author(s) 2018.

**Preliminary report: Decreasing incidence of delirium in surgical intensive care unit by maintaining target cerebral oxygen using regional cerebral oxygen saturation (rso2) during intraoperative major surgery**

**Author(s):** Auksornchat K.; Kumwilaisak K.

**Source:** Critical Care; 2018; vol. 22

Available at [Critical Care](#) - from PubMed Central

**Abstract:** Introduction: Delirium is a major cause of complications in postoperative patient in ICU. Risk factors for delirium include poor cerebral hemodynamics and peri-operative cerebral desaturations. Intraoperative target cerebral oximetry monitoring may decrease the incidence of postoperative delirium in elective major abdominal surgery patients. Methods: A single-blinded, randomised controlled trial in patients undergo elective major abdominal surgery who received postoperative care in surgical ICU with age more than 65 years were randomised into two groups. The intervention group was received intra-operative target cerebral oxygen monitoring using cerebral oximetry whereas the control group was not. Delirium was assessed in both group at 24, 48, 72 hour postoperatively. Other risk factors for delirium, mechanical ventilator day, length of ICU stay, length of hospital stay and post-operative complication were recorded. Results: From August 2015-March 2016, 37 patients who met the criteria were randomised to 19 patients in intervention group and 18 patients in control group. Overall incidence of delirium was 27.03% (Intervention 21.05% VS Control 33.34%,  $p=0.401$ ). Baseline cerebral oxygen in intervention group was 66.79 +/- 3.11%. Desaturation below 10% from baseline was found in 8 from 19 patients (42.1%) and was the only significant risk factor associated with delirium ( $p=.008$ , odd ratio 1.68). There was no significant different in mechanical ventilator day, ICU length of stay, hospital length of stay and postoperative complication between both groups. There was no complication associated with application of the cerebral oximetry probe in the intervention group. Conclusions: From this preliminary report can not demonstrated the significant different of intra-operative target cerebral oxygen monitoring by using cerebral oximetry in prevention of delirium. However the reduction of cerebral oxygen more than 10% from baseline in intervention group showed significantly associated with delirium postoperatively.

**Feasibility of employing family-administered delirium detection tools in the intensive care unit (ICU)**

**Author(s):** Fiest K.; Krewulak K.; Stelfox H.T.; Davidson J.; Ely E.W.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:** Introduction: Our objective was to determine the feasibility of employing family-administered tools to detect delirium in the critically ill. The use of family-administered delirium detection tools has not been assessed in the ICU where patients are critically ill and frequently

intubated. Family members may be able to detect changes in patient cognition and behavior from pre-illness levels earlier than unfamiliar providers. These tools may be a valuable diagnostic adjunct in the ICU. Methods: Consecutive patients and family members (dyads) in the largest adult ICU in Calgary, Canada were recruited (Aug. 9-Sept. 11, 2017). Inclusion criteria were: patients with a Richmond Agitation Sedation Scale (RASS)  $\geq -3$ ; no primary brain injury and Glasgow Coma Scale score of  $<9$ ; ability to provide informed consent (patient/ surrogate); and remain in ICU for 24 hours. Data were collected for up to 5 days. Family-administered delirium assessments were completed once daily (Family Confusion Assessment Method & Sour Seven). To assess feasibility, we assessed proportion of eligible patients and percent family member enrollment. Barriers to enrollment were categorized. Results: Of 99 admitted patients with family, 37 (37%) met inclusion criteria and 17 (46%) dyads consented. 20% of admitted patients did not have family and were thus ineligible. 73% of enrolled dyads assessed delirium at least once, with a median of 5 (of 10 total) assessments. The most common reason for non-enrollment was refusal by the family, who commonly reported feeling overwhelmed by the ICU environment. Barriers with nursing staff were encountered, including not providing access to patients and patient exclusion. Conclusions: These data suggest that employing family-administered delirium detection tools in the ICU is feasible for a subset of the population. Future studies will validate the use of these tools in the ICU, decrease modifiable barriers to enrollment, and test strategies to overcome attitudinal barriers towards employing these tools.

### **Pre-existing cognitive dysfunction in critically ill patients and the incidence of delirium during ICU treatment**

**Author(s):** Konning S.T.; Ramnarain D.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:** Introduction: Cognitive dysfunction is a major factor leading to disability and poor quality of life in ICU survivors. In order to identify patients at risk for developing cognitive dysfunction due to critical illness or ICU treatment, one has to discriminate between patients with pre-existing cognitive dysfunction and those developing new cognitive dysfunction or worsening of cognitive function during ICU treatment. We investigated the incidence of pre-existing cognitive dysfunction in ICU patients using the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE) and its relation with delirium during ICU treatment. Methods: Patients relatives were asked to fill in the IQCODE on admission. An overall score on cognitive dysfunction was calculated by the average of the score on each item of the questionnaire. The incidence of delirium was based on the CAM-ICU score. Statistical analysis was performed using the Fisher's exact test. P-values of less than 0.05 were deemed significant. Results: In total 452 consecutive patients admitted to our ICU were analyzed, of whom 47.8% (n=216) showed decline in cognitive function prior to ICU admission. Cognitive function was divided in four groups; no change 52.2% (n=236), slight decline 34.1% (n=154), moderate decline 9.7% (n=44) and severe decline 4.0% (n=18) (Fig. 1). Incidence of delirium is shown in Fig. 2. Patients with moderate to severe cognitive dysfunction showed significant more delirium during ICU treatment than patients with no change in cognition (44.2% and 21.1% respectively, (p=0.023)). Conclusions: Almost half of the patients admitted to the ICU have cognitive dysfunction prior to ICU admission. To assess ones cognitive function after ICU treatment one has to take in to account the patients pre-existing cognitive functioning. Patients with a moderate to severe pre-existing cognitive dysfunction develop significantly more delirium during ICU treatment. (Figure presented).

### **Therapeutic Advances in the Management of Older Adults in the Intensive Care Unit: A Focus on Pain, Sedation, and Delirium**

**Author(s):** Moore S.

**Source:** American Journal of Therapeutics; 2018; vol. 25 (no. 1)

**Publication Type(s):** Article

**Abstract:**Background: Older adults currently account for over half of all intensive care unit admissions. Although advances in critical care medicine have led to improved survival, critical illness is still associated with high short-term and long-term morbidity and mortality. Areas of Uncertainty: Elderly survivors of critical illness often have long-lasting physical, cognitive, and psychological disabilities. Several iatrogenic risk factors for post-critical illness impairments have been identified, including delirium, deep sedation, and inadequate analgesia. Multicomponent interventions or bundles, which target many of these risk factors, have been shown to improve patient outcomes. However, there is limited literature that addresses the optimal pharmacologic management of analgesia and sedation in elderly critically ill patients who are known to have altered pharmacokinetics and pharmacodynamics. There are also uncertainties regarding the treatment and prophylaxis of delirium in this patient population. Therapeutic Advances: Various interventions can improve the pharmacologic management of pain, agitation, and delirium and subsequently improve outcomes in critically ill elderly patients. Pain should be managed with multimodal therapy and opioids should be used judiciously. Benzodiazepines should be avoided and dexmedetomidine may be the best first-line sedative in this population. Only patients with hyperactive delirium should receive treatment with antipsychotics and there is likely no role of antipsychotics for delirium prophylaxis. New literature suggests that dexmedetomidine may be effective for the prevention and treatment of intensive care unit delirium. Conclusions: Elderly patients are more sensitive to centrally acting medications and often require lower doses than younger patients because of alterations in pharmacokinetics. A newer medication, dexmedetomidine, has demonstrated some benefit over other sedatives and may have a role in the management of delirium. Overall, more research is needed on the pharmacologic management of pain, sedation, and delirium in the elderly critically ill population. Copyright © 2018 Wolters Kluwer Health, Inc. All rights reserved.

#### **Integration of an Abbreviated ICU Cognitive Failure Questionnaire.**

**Author(s):** Theriault, Brandon M.; Schlesinger, Joseph J.

**Source:** Critical Care Medicine; May 2018; vol. 46 (no. 5)

**Publication Type(s):** Academic Journal

Available at [Critical Care Medicine](#) - from Ovid (Journals @ Ovid) - Remote Access

#### **Innovation in Clinical Practice: A Preliminary Study on Delirium Assessment in Intensive Care Unit Using an Application for Smartphone.**

**Author(s):** Giusti, Gian Domenico

**Source:** Dimensions of Critical Care Nursing; May 2018; vol. 37 (no. 3); p. 194-195

**Publication Type(s):** Academic Journal

**Abstract:**The article discusses a preliminary study about delirium assessment in intensive care unit (ICU) using an application for smartphone. Study highlights include validated screening tools to evaluate ICU delirium, the 2013 Pain, Agitation, and Delirium Guidelines, and the embedding of smartphone apps into clinical practices and the technological infrastructures in the hospital.

#### **Evaluating an educational campaign for delirium assessment training in the burn ICU: What works, what doesn't, and suggestions for future efforts**

**Author(s):** Van Cleave A.; Clark A.; Campbell S.; Lane C.; McMahon M.; Rosenthal J.; Poteet J.;

**Source:** Journal of Burn Care and Research; Apr 2018; vol. 39



**Publication Type(s):** Conference Abstract

**Abstract:**Introduction: The aim of this performance improvement project was to examine the impact of an educational campaign on the ability of Burn ICU nurses to accurately utilize the four-feature Confusion Assessment Method (CAM) ICU Delirium assessment tool in our verified Level I burn center. Methods: From July 2016 to July 2017, intubated burn patients were assessed using the four-feature CAM ICU Delirium assessment tool. Data from the first nursing assessment of every shift was collected. Correct CAM-ICU delirium assessment performance was defined as documenting: assessment of fluctuations in mental status from previous shifts (Feature 1); assessment of inattention using the "SAVEAHAART" technique (Feature 2); EITHER current RASS score (Feature 3) OR evidence of disorganized thinking (Feature 4); or documenting Unable to Assess (UTA) for patients that could not follow commands. Two nonstandardized educational campaigns targeting correct CAM ICU Delirium assessment performance were performed on 3/1/17 and 6/5/17 by a single specialized nurse educator. A follow-up survey was sent to the Burn ICU nurses on 8/1/17 to elicit perceptions of use of the CAM ICU Delirium assessment tool. Results: Both educational sessions were attended by 100% (n=34) of all dedicated Burn ICU nurses. For the time period of the project, a total of 1185 CAM ICU Delirium assessments were conducted on 130 intubated burn patients. Before 3/1/17 (n = 697 assessments), 7% of assessments were conducted and documented correctly. Between 3/1/17 and 6/4/17 (n = 297 assessments), 17% of assessments were conducted and documented correctly. After 6/5/17 (n = 190 assessments), 47% of assessments were performed and documented correctly. The most common reasons for inaccurate performance and documentation included: problems assessing Feature 1 (n=672) in isolation, Feature 2 in isolation (n=304), and problems assessing both Features 1 and 2 jointly (n=204). Interestingly, no instances of incorrect performance and documentation of features 3 or 4 were noted. The post-project surveys had a 74% response rate with 76% of these respondents perceiving that they were performing and documenting the delirium assessment correctly. When asked to list barriers to using the tool, 36% of respondents reported difficulty assessing Feature 2 in burn patients, 29% reported that the tool was confusing, and 17% said it took too long to complete. Conclusions: Burn ICU nurses struggle to master Features 1 and 2 of the CAM-ICU delirium assessment tool; further, they frequently do not recognize they are having difficulty. Applicability of Research to Practice: CAM-ICU assessment instructors should be vigilant for learners' difficulties with Features 1 and 2 and be prepared to modify their curriculum accordingly.

**Spontaneous breathing and awakening trials plus a multimodal sedation/ agitation protocol decrease vent days and benzodiazepine use in the burn ICU**

**Author(s):** McGinn K.; Miller R.; Ding L.; Brevard S.B.; Simmons J.D.; Kahn S.

**Source:** Journal of Burn Care and Research; Apr 2018; vol. 39

**Publication Type(s):** Conference Abstract

**Abstract:**Introduction: Continuous sedation for ventilated patients is commonplace in an ICU setting. However, the use of prolonged sedation is associated with increased ICU length of stay (LOS), as well as duration of mechanical ventilation and ICU delirium in critically ill adults. Although these outcomes have been studied in mixed ICU populations, there is little published data in critically-ill burn patients. A spontaneous awakening and breathing trial (SAT/SBT) protocol was instituted in the burn ICU in January of 2012, with a resultant decrease in ventilator days. The protocol was updated in August of 2015, mandating lighter levels of sedation and use of alpha-2 agents and antipsychotics instead of benzodiazepine infusions. This study seeks to longitudinally compare clinical outcomes in critically ill burn patients before and after the implementation of each protocol. Methods: This study was conducted as a single center, retrospective, observational comparison between the pre-protocol group and the two iterations of the SAT/SBT protocol. Patients  $\geq 19$  years of age with  $\geq 20\%$ TBSA burns were included. Patients who expired within 48 hours of admission were excluded. Sedation levels were measured using the Richmond Agitation Sedation Scale (RASS) with a target of 0-1 and

delirium screening was conducted using the Confusion Assessment Method-ICU (CAM-ICU). Outcomes were compared with nonparametric statistics. Results: Study groups had similar demographics and burn size. Patients in the post-protocol groups showed a significant increase in ventilator-free days (11.5 to 25.5 to 25,  $p=0.0295$ ), and spent more time within RASS goal (0 to 1,  $p=0.0385$ ). There was a reduction in benzodiazepine from a median of 1 to 0 days between the original and revised protocol ( $p<0.05$ ) and in total number of patients that were on a benzo infusion for any time at all (58% vs 27%,  $P<0.05\%$ ). There was a trend for decreased mortality over time (23.7% to 17.2% to 13.3%,  $p=0.3263$ ). Conclusions: This study supports the use of SAT/SBT protocols along with multimodal adjuncts to minimize agitation. These endeavors reduce ventilator and benzodiazepine use. Data collection should continue in order to gauge the long term effects of continued adherence to sedation protocols and increase study power to detect delirium and mortality differences. Applicability of Research to Practice: SAT/SBT protocols and benzodiazepine reductions improve clinical outcomes and need to be further studied in burn populations.

**Study protocol to assess the effectiveness and safety of a flexible family visitation model for delirium prevention in adult intensive care units: a cluster-randomised, crossover trial (The ICU Visits Study).**

**Author(s):** Rosa, Regis Goulart; Falavigna, Maicon; Robinson, Caroline Cabral;

**Source:** BMJ open; Apr 2018; vol. 8 (no. 4); p. e021193

**Publication Type(s):** Journal Article

Available at [BMJ open](#) - from Europe PubMed Central - Open Access

**Abstract:**INTRODUCTIONFlexible intensive care unit (ICU) visiting hours have been proposed as a means to improve patient-centred and family-centred care. However, randomised trials evaluating the effects of flexible family visitation models (FFVMs) are scarce. This study aims to compare the effectiveness and safety of an FFVM versus a restrictive family visitation model (RFVM) on delirium prevention among ICU patients, as well as to analyse its potential effects on family members and ICU professionals.METHODS AND ANALYSISA cluster-randomised crossover trial involving adult ICU patients, family members and ICU professionals will be conducted. Forty medical-surgical Brazilian ICUs with RFVMs (<4.5 hours/day) will be randomly assigned to either an RFVM (visits according to local policies) or an FFVM (visitation during 12 consecutive hours per day) group at a 1:1 ratio. After enrolment and follow-up of 25 patients, each ICU will be switched over to the other visitation model, until 25 more patients per site are enrolled and followed. The primary outcome will be the cumulative incidence of delirium among ICU patients, measured twice a day using the Confusion Assessment Method for the ICU. Secondary outcome measures will include daily hazard of delirium, ventilator-free days, any ICU-acquired infections, ICU length of stay and hospital mortality among the patients; symptoms of anxiety and depression and satisfaction among the family members; and prevalence of burnout symptoms among the ICU professionals. Tertiary outcomes will include need for antipsychotic agents and/or mechanical restraints, coma-free days, unplanned loss of invasive devices and ICU-acquired pneumonia, urinary tract infection or bloodstream infection among the patients; self-perception of involvement in patient care among the family members; and satisfaction among the ICU professionals.ETHICS AND DISSEMINATIONThe study protocol has been approved by the research ethics committee of all participant institutions. We aim to disseminate the findings through conferences and peer-reviewed journals.TRIAL REGISTRATIONNCT02932358.

**Delirium in the Intensive Care Unit: Incidence, risk factors, and impact on outcome**

**Author(s):** Tilouche N.; Hassen M.F.; Ali H.B.S.; Jaoued O.; Gharbi R.; El Atrous S.

**Source:** Indian Journal of Critical Care Medicine; Mar 2018; vol. 22 (no. 3); p. 144-149

**Publication Type(s):** Article

Available at [Indian journal of critical care medicine : peer-reviewed, official publication of Indian Society of Critical Care Medicine](#) - from ProQuest (Hospital Premium Collection) - NHS Version

**Abstract:**Background: The incidence and risk factors for delirium vary among studies. Objective: We aimed to determine the incidence, risk factors, and impact on outcome of delirium in a medical Intensive Care Unit (ICU) in Tunisia using a prospective observational study. Patients: All consecutive patients admitted to the ICU between May 2012 and April 2013 were included if they were aged more than 18 years and had an ICU stay of more than 24 h. Patients who had a cardiac arrest or have a history of dementia or psychosis were excluded. Patients eligible for the study were evaluated by the medical staff to detect delirium using the CAM-ICU. Results: A total of 206 patients were included, 167 did not present delirium and 39 (19%) were analyzed for delirium. Delirious patients had a significantly longer duration of mechanical ventilation (10 days[6-20] vs. 2 days[0-7]) respectively and length of stay in ICU (21.5 days [10.5-32.5] vs. 8 days [5-13]), with no impact on mortality. Delirium was associated with high incidence of unintentional removal of catheters (39% vs. 9%;  $P < 0.0001$ ), endotracheal tubes (18% vs. 1%;  $P < 0.0001$ ), and urinary catheters (28% vs. 2%,  $P < 0.0001$ ). In multivariable risk regression analysis, age (odds ratio [OR] = 4.1, 95% confidence interval [CI]: 1.39-12.21;  $P = 0.01$ ), hypertension (OR = 3.3, 95% CI: 1.31-8.13;  $P = 0.011$ ), COPD (OR = 3.5, 95% CI: 1.47-8.59;  $P = 0.005$ ), steroids (OR = 2.8, 95% CI: 1.05-7.28;  $P = 0.038$ ), and sedation (OR = 5.4, 95% CI: 2.08-13.9;  $P < 0.0001$ ) were independent risk factors for delirium. We did not find a relationship between delirium and mortality. Conclusion: Delirium is frequent in the ICU and is associated with poor outcome. Several risk factors for delirium are linked to intensive care environment. Copyright © 2018 Medknow Publications. All rights reserved.

#### **Delirium and effect of circadian light in the intensive care unit: a retrospective cohort study**

**Author(s):** Estrup S.; Kjer C.K.W.; Poulsen L.M.; Mathiesen O.; Gogenur I.

**Source:** Acta Anaesthesiologica Scandinavica; Mar 2018; vol. 62 (no. 3); p. 367-375

**Publication Type(s):** Article

**Abstract:**Background: Delirium is a serious condition often experienced by critically ill patients in intensive care units (ICUs). The role of circadian light for this condition is unclear. The aim of this study was to describe incidence of delirium, risk factors for delirium, and the association between delirium and circadian light for patients in the ICU. Methods: This is a retrospective cohort study of all patients at a Danish ICU from 1 August 2015 to 31 January 2016. Exclusion criteria were heavy sedation, no Confusion Assessment Method for the ICU (CAM-ICU) scores, or inability to communicate in Danish. Delirium was defined as at least one positive CAM-ICU score or treatment with haloperidol. Three of nine beds at the ICU had a circadian light installation. Allocation to ICU beds with or without circadian light depended on availability at admission. Risk factors for development of delirium were analyzed by simple and multiple logistic regression. Results: We included 183 patients in the study. The incidence of delirium was 28% (95% CI 22, 35). Allocation to beds with or without circadian lighting was not associated with delirium incidence (OR 1.14; 95% CI 0.55, 2.37;  $P = 0.73$ ). We found that Simplified Acute Physiology Score II (SAPS II) (OR 1.03; 95% CI 1.01, 1.06;  $P = 0.002$ ), and dexmedetomidine was associated with delirium (OR 4.14; 95% CI 1.72, 10.03;  $P = 0.002$ ). Conclusion: In this population of patients admitted to an ICU during 6 months, the incidence of delirium was 28%. We did not find an association between circadian light and development of delirium. Copyright © 2017 The Acta Anaesthesiologica Scandinavica Foundation. Published by John Wiley & Sons Ltd

#### **Cognitive impairment in intensive care unit patients: The feasibility of a comprehensive exploration of incidence and trajectory.**

**Author(s):** Elliott, R.; Yarad, E.; Webb, S.; Cheung, K.; Bass, F.; Hammond, N.; Elliott, D.

**Source:** Australian Critical Care; Mar 2018; vol. 31 (no. 2); p. 126-127

**Publication Type(s):** Academic Journal

**The relationship of delirium and risk factors in cardiology intensive care unit patients with the nursing workload.**

**Author(s):** Öztürk Birge, A; Bedük, T

**Source:** Journal of clinical nursing; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:**AIMS AND OBJECTIVESThe aim of the study is to evaluate the relationship of delirium and risk factors in cardiology intensive care unit (ICU) patients with the nursing workload.BACKGROUNDDelirium is a common syndrome in patients with cardiac problems. The risk factors causing delirium and the presence and type of delirium affect the nurse workload and patient care quality adversely.DESIGNThis cross-sectional study was conducted with 133 patients staying at the cardiology ICU of a university hospital between January 5 and March 31, 2017.METHODThe study data were collected using the Patient Information Form, Delirium Risk Factors Form, and Therapeutic Intervention Scoring System-28 (TISS-28) scale to identify the nurse workload. The statistical analysis of the data was performed using frequency, chi-square, Mann-Whitney U, correlation, and regression analyses.RESULTSIt was found that patients who developed delirium were 65 years or older, they had more Nasogastric / Total Parenteral Nutrition (NG/TPN), benzodiazepine, and physical restraints in comparison to those with no delirium development, and that the prevalence of hypoxia and hypoalbuminemia were higher in these patients. The mean TISS-28 score was higher in patients with delirium, compared to those without delirium. There was a positive correlation between the mean Acute Physiology and Chronic Health Evaluation II (APACHE II) scores and the mean TISS-28 score of the patients. The mean TISS-28 score was found to significantly increase with being at the age of 65 and above and the administration of mechanical ventilation. The patients with delirium required a mean of 60-min additional care.CONCLUSIONSOur study results suggest that the presence of delirium and the delirium risk factors, irrespective of delirium, increase the nurse workload. This article is protected by copyright. All rights reserved.

**e-Screening revolution: A novel approach to developing a delirium screening tool in the intensive care unit.**

**Author(s):** Eeles, Eamonn; Gunn, Hayley; Sutt, Anna-Liisa; Pinsker, Donna; Flaws, Dylan; Jarrett, Paul

**Source:** Australasian journal on ageing; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:**OBJECTIVESDelirium is common in the intensive care unit (ICU), often affecting older patients. A bedside electronic tool has the potential to revolutionise delirium screening. Our group describe a novel approach to the design and development of delirium screening questions for the express purpose of use within an electronic device. Preliminary results are presented.METHODSOur group designed a series of tests which targeted the clinical criteria for delirium according to Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (DSM-5) criteria against predefined requirements, including applicability to older patients.RESULTSCandidate questions, including tests of attention and awareness, were devised and then refined by an expert multidisciplinary group, including geriatricians. A scoring scheme was constructed, with testing to failure an indicator of delirium. The device was tested in healthy controls, aged 20-80 years, who were recorded as being without delirium.CONCLUSIONe-Screening for delirium requires a novel approach to instrument design but may revolutionise recognition of delirium in ICU.

**Frequency and risk factors for subsyndromal delirium in an intensive care unit.**

**Author(s):** Yamada, Chikayo; Iwawaki, Yoko; Harada, Kiyomi; Fukui, Michihiko; Morimoto, Masafumi

**Source:** Intensive & critical care nursing; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:**OBJECTIVE Delirium and subsyndromal delirium in critically ill patients are important determinants of long-term functional disability and cognitive impairment. However, few outcome studies on sub-syndromal delirium have been reported. Thus, this study aimed to evaluate the incidence of delirium and sub-syndromal delirium as well as the risk factors and progression to delirium. DESIGN A prospective cohort study. SETTINGS Six bed medical and surgical intensive care unit in Otsu Municipal Hospital in Japan. METHODS Delirium and sub syndromal delirium were evaluated using the Intensive Care Delirium Screening Checklist scores and the demographic data of the patients recorded. Statistical analyses were conducted using the Mann-Whitney U test and chi-square test for comparison. We also compared groups using multivariate analyses. RESULTS Of the 380 patients who were screened, 15.8% and 33.9% had delirium or sub syndromal delirium, respectively and 9.5% of patients progressed from a state of sub syndromal delirium to delirium. Older age, predisposing cognitive impairment, blood transfusion, higher Acute Physiology and Chronic Health Evaluation II (APACHE II) score, low red blood cell count and high C-reactive protein levels were the risk factors highly associated with subsyndromal delirium symptoms. Older age, acute admission, steroid use, the utilisation of restraints and lower PaO<sub>2</sub> were the determinants of progression to delirium. CONCLUSION A high incidence of sub syndromal delirium was observed in critically ill patients. Patient with sub syndromal delirium must be promptly identified and treated due to the risk of progression to delirium.

#### **Looking for light in the din: An examination of the circadian-disrupting properties of a medical intensive care unit.**

**Author(s):** Danielson, Samantha J; Rappaport, Charles A; Loher, Michael K; Gehlbach, Brian K

**Source:** Intensive & critical care nursing; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:**OBJECTIVE Critically ill patients exhibit profound disturbances of circadian rhythmicity, most commonly in the form of a phase delay. We investigated the specific zeitgeber properties of a medical intensive care unit to develop a model that explained these abnormalities. RESEARCH METHODOLOGY Prospective, observational study conducted during 2013-2014. Twenty-four-hour ambient light (lux, 672 hours) and sound pressure levels (dBA, 504 hours) were measured in patient rooms. Patients and families were surveyed regarding their perceptions of the environment. SETTING University-based adult medical intensive care unit. MAIN OUTCOME MEASURE The timing and intensity of the ambient light-dark cycle and sound environment and the relationship of these measurements to patient/family perceptions. RESULT Twenty-four-hour light-dark cycles were extremely weak and phase delayed relative to the solar cycle. Morning light averaged 12.1 (4.8, 37.2) lux, when only 24.9% ± 10.9% of available light was utilised; yet patients and families did not identify low daytime light levels as problematic. Median noise levels were invariably excessive (nighttime 47.9 [45.0, 51.3] dBA) with minimal variation, consistent with the absence of a defined rest period. CONCLUSION The intensive care unit functions as a near-constant routine protocol disconnected from solar time. Behavioural interventions to promote entrainment should be supported by objective measurements of light and sound.

#### **Extended visitation policy may lower risk for delirium in the intensive care unit.**

**Author(s):** Schwanda, Manuel; Gruber, Rita

**Source:** Evidence-based nursing; Mar 2018

**Publication Type(s):** Journal Article

Available at [Evidence-based nursing](#) - from BMJ Journals

### **Prediction and early detection of delirium in the intensive care unit by using heart rate variability and machine learning.**

**Author(s):** Oh, Jooyoung; Cho, Dongrae; Park, Jaesub; Na, Se Hee; Kim, Jongin; Heo, Jaeseok

**Source:** Physiological measurement; Mar 2018; vol. 39 (no. 3); p. 035004

**Publication Type(s):** Journal Article

**Abstract:**OBJECTIVE Delirium is an important syndrome found in patients in the intensive care unit (ICU), however, it is usually under-recognized during treatment. This study was performed to investigate whether delirious patients can be successfully distinguished from non-delirious patients by using heart rate variability (HRV) and machine learning. APPROACH Electrocardiography data of 140 patients was acquired during daily ICU care, and HRV data were analyzed. Delirium, including its type, severity, and etiologies, was evaluated daily by trained psychiatrists. HRV data and various machine learning algorithms including linear support vector machine (SVM), SVM with radial basis function (RBF) kernels, linear extreme learning machine (ELM), ELM with RBF kernels, linear discriminant analysis, and quadratic discriminant analysis were utilized to distinguish delirium patients from non-delirium patients. MAIN RESULTS HRV data of 4797 ECGs were included, and 39 patients had delirium at least once during their ICU stay. The maximum classification accuracy was acquired using SVM with RBF kernels. Our prediction method based on HRV with machine learning was comparable to previous delirium prediction models using massive amounts of clinical information. SIGNIFICANCE Our results show that autonomic alterations could be a significant feature of patients with delirium in the ICU, suggesting the potential for the automatic prediction and early detection of delirium based on HRV with machine learning.

### **Designing a nurse-delivered delirium bundle: What intensive care unit staff, survivors, and their families think?**

**Author(s):** Bannon, Leona; McGaughey, Jennifer; Clarke, Mike; McAuley, Daniel F

**Source:** Australian critical care : official journal of the Confederation of Australian Critical Care Nurses; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:**BACKGROUND Implementation of quality improvement interventions can be enhanced by exploring the perspectives of those who will deliver and receive them. We designed a non-pharmacological bundle for delirium management for a feasibility trial, and we sought to obtain the views of intensive care unit (ICU) staff, survivors, and families on the barriers and facilitators to its implementation. OBJECTIVE The objective of this study is to determine the barriers and facilitators to a multicomponent bundle for delirium management in critically ill patients comprising (1) education and family participation, (2) sedation minimisation and pain, agitation, and delirium protocol, (3) early mobilisation, and (4) environmental interventions for sleep, orientation, communication, and cognitive stimulation. METHODS Nine focus group interviews were conducted with ICU staff (n = 68) in 12 UK ICUs. Three focus group interviews were conducted with ICU survivors (n = 12) and their family members (n = 2). Interviews were digitally recorded, transcribed, and thematically analysed using the Braun and Clarke framework. RESULTS Overall, staff, survivors, and their families agreed the bundle was acceptable. Facilitating factors for delivering the bundle were staff and relatives' education about potential benefits and encouraging family presence. Facilitating factors for sedation minimisation were evening ward rounds, using non-verbal pain scores, and targeting sedation scores. Barriers identified by staff were inadequate resources, poor education, relatives' anxiety, safety concerns, and ICU culture. Concerns were raised about patient confidentiality when displaying orientation materials and managing resources for early mobility. Survivors cited that flexible visiting and re-establishing normality were important factors; and staff workload, lack of awareness, and poor communication were factors that needed to be considered before

implementation. **CONCLUSION** Generally, the bundle was deemed acceptable and deliverable. However, like any complex intervention, component adaptations will be required depending on resources available to the ICU; in particular, involvement of pharmacists in the ward round and physiotherapists in mobilising intubated patients.

### **Effect of organisational factors on the variation in incidence of delirium in intensive care unit patients: A systematic review and meta-regression analysis.**

**Author(s):** Rood, Paul; Huisman-de Waal, Getty; Vermeulen, Hester; Schoonhoven, Lisette

**Source:** Australian critical care : official journal of the Confederation of Australian Critical Care Nurses; Mar 2018

**Publication Type(s):** Journal Article Review

**Abstract:** **BACKGROUND** Delirium occurs frequently in intensive care unit (ICU) patients and is associated with numerous deleterious outcomes. There is a large variation in reported delirium occurrence rates, ranging from 4% to 89%. Apart from patient and treatment-related factors, organisational factors could influence delirium incidence, but this is currently unknown. **OBJECTIVE** To systematically review delirium incidence and determine whether or not organisational factors may contribute to the observed delirium incidence in adult ICU patients. **METHODS** Systematic review of prospective cohort studies reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement. Included articles were independently assessed by two researchers. Quality of the articles was determined using the Strengthening the Reporting of Observational Studies in Epidemiology checklist. Subsequently, apart from patient characteristics, a meta-regression analysis was performed on available organisational factors, including hospital type, screening method and screening frequency. **DATA SOURCES** PubMed, Embase, CINAHL, and Cochrane Library databases were searched from inception to 27 January 2017, without language limitation. **RESULTS** A total of 9357 articles were found, of which 19 articles met the inclusion criteria and were considered as true delirium incidence studies. The articles were of good methodological quality (median [interquartile range] 32/38 [30-35] points), published between 2005 and 2016, originated from 17 countries. A total of 9867 ICU patients were included. The incidence rate of delirium varied between 4% and 55%, with a mean  $\pm$  standard deviation of  $29 \pm 14\%$ . Data relating to three organisational factors were included in the studies, but they were not significantly associated with the reported delirium incidence: hospital type ( $p$  0.48), assessment methods ( $p$  0.41), and screening frequency ( $p$  0.28). **CONCLUSION** The mean incidence of delirium in the ICU was 29%. The organisational factors found including methods of delirium assessment, screening frequency, and hospital type were not related to the reported ICU delirium incidence.

### **Risk Factors of Postoperative Delirium in the Intensive Care Unit After Liver Transplantation.**

**Author(s):** Lee, Hannah; Oh, Seung-Young; Yu, Je Hyuk; Kim, Jeongsoo; Yoon, Sehee; Ryu, Ho Geol

**Source:** World journal of surgery; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:** **BACKGROUND** Postoperative delirium after liver transplantation is relatively common, especially due to preexisting conditions such as hepatic encephalopathy. Most studies of delirium after liver transplantation were based on ICU practices using deep hypnosisedation. Therefore, risk factors and consequences of postoperative delirium after liver transplantation were evaluated in the light sedation era. **METHODS** A total of 253 liver transplantation patients were evaluated for postoperative delirium. Clinical outcomes including mortality were compared between patients who suffered delirium and those who did not. Risk factors for postoperative delirium were analyzed with subgroup analysis depending on MELD scores and type of liver transplantation. **RESULTS** Post-liver transplant delirium developed in 17% of the patients, 88% of which occurred within the first postoperative day. Alcoholic liver cirrhosis, class C Child-Pugh score, higher MELD scores, higher

proportion of deceased donor liver transplantation, and reintubation were more frequent in patients who developed delirium, but there was no difference in mortality. Higher preoperative MELD group (15-24 vs. <15; OR 4.10, 95% CI [1.67-10.09],  $P = 0.002$ ,  $\geq 25$  vs. <15; OR 5.59, 95% CI [2.06-15.19],  $P < 0.01$ ), higher APACHE II scores (OR 5.59, 95% CI [2.06-15.19],  $P < 0.01$ ), and reintubation (OR 6.46, 95% CI [2.10-19.88],  $P < 0.01$ ) were identified as significant risk factors for postoperative delirium. **CONCLUSION** Postoperative delirium after liver transplantation was associated with worse clinical outcomes. MELD scores greater than 15 were predictive of postoperative delirium in both living and deceased donor liver transplantation.

### **Low-dose Nocturnal Dexmedetomidine Prevents ICU Delirium: A Randomized, Placebo-controlled Trial.**

**Author(s):** Skrobik, Yoanna; Duprey, Matthew S; Hill, Nicholas S; Devlin, John W

**Source:** American journal of respiratory and critical care medicine; Mar 2018

**Publication Type(s):** Journal Article

Available at [American journal of respiratory and critical care medicine](#) - from EBSCO (MEDLINE Complete)

**Abstract:** **RATIONALE** Dexmedetomidine is associated with less delirium than benzodiazepines, and better sleep architecture than either benzodiazepines or propofol; its effect on delirium and sleep when administered at night to patients requiring sedation remains unclear. **OBJECTIVES** To determine if nocturnal dexmedetomidine prevents delirium and improves sleep in critically ill adults. **METHODS** This two-center, double-blind, placebo-controlled trial randomized 100 delirium-free critically ill adults receiving sedatives to receive nocturnal (21:30 to 6:15h) intravenous dexmedetomidine (0.2 mcg/kg/hr, titrated by 0.1 mcg/kg/hr every 15 minutes until a goal RASS = -1 or maximum rate of 0.7 mcg/kg/hr was reached) or placebo until ICU discharge. During study infusions, all sedatives were halved; opioids were unchanged. Delirium was assessed using the Intensive Care Delirium Screening Checklist every 12 hours throughout the ICU admission. Sleep was evaluated each morning by the Leeds Sleep Evaluation Questionnaire (LSEQ). **MEASUREMENTS AND MAIN RESULTS** Nocturnal dexmedetomidine (versus placebo) was associated with a greater proportion of patients who remained delirium-free during the ICU stay [dexmedetomidine [40 (80%) of 50 patients] vs. placebo [27 (54%) of 50 patients] (RR = 0.44, 95% CI, 0.23 to 0.82,  $p=0.006$ ). The average LSEQ score was similar [MD 0.02; 95% CI, 0.42 to 1.92] between the 34 dexmedetomidine (average 7 assessments/patient) and 30 placebo (6/patient) group patients able to provide  $\geq 1$  assessment. Incidence of hypotension, bradycardia or both did not differ significantly between groups. **CONCLUSIONS** Nocturnal administration of low-dose dexmedetomidine in critically ill adults reduces the incidence of delirium during the ICU stay; patient-reported sleep quality appears unchanged. Clinical trial registration available at [www.clinicaltrials.gov](http://www.clinicaltrials.gov), ID NCT01791296.

### **Delirium in ICU patients following cardiac surgery: An observational study.**

**Author(s):** Simeone, Silvio; Pucciarelli, Gianluca; Perrone, Marco; Teresa, Rea; Gargiulo, Gianpaolo

**Source:** Journal of clinical nursing; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:** **AIMS AND OBJECTIVES** To observe the clinical and structural factors that can be associated with the post-operative onset of delirium in patients who have undergone heart surgery. **BACKGROUND** Several risk factors could contribute to the development of delirium, such as the use of some sedative drugs and a patient's history with certain types of acute chronic disease. However, in the literature, there is little knowledge about the association between delirium in patients who have undergone cardiac surgical intervention and their clinical and environmental predictors. **DESIGN** We used an observational design. **METHODS** We enrolled 89 hospitalised patients



in the ICU. Patients were first evaluated using the Richmond Agitation Sedation Scale and subsequently using the Confusion Assessment Method for the ICU. A linear model of regression was used to identify the predictors of delirium in patients. **RESULT** The patients had an average age of 89 years (SD = 6.9), were predominantly male (84.3%) and were mostly married (79.8%). The majority of patients had been subjected to bypass (80.9%), while 19.1% had undergone the intervention of endoprosthesis. The logistic regression model showed that patient age, the duration of mechanically assisted ventilation, continuous exposure to artificial light and the presence of sleep disorders were predictors of the onset of delirium. **CONCLUSION** This study further confirms that clinical aspects such as insomnia and one's circadian rhythm as well as structural elements such as exposure to artificial light are variables that should be monitored in order to prevent and treat the onset of severe post-operative delirium. **RELEVANCE TO CLINICAL PRACTICE** Identifying the possible factors that predispose a patient to the onset of delirium during intensive therapy following cardiac surgery, it is fundamental to implement interventions to prevent this syndrome.

**Influence of physical restraint on delirium of adult patients in ICU: A nested case-control study.**

**Author(s):** Pan, Yanbin; Jiang, Zhixia; Yuan, Changrong; Wang, Lianhong; Zhang, Jingjing; Zhou, Jin

**Source:** Journal of clinical nursing; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:** **AIMS AND OBJECTIVES** To investigate the impact of physical restraint on delirium of adult patients in intensive care unit. **BACKGROUND** Delirium is a common clinical syndrome in intensive care unit, correlated with various adverse clinical outcomes. Physical restraint is a precipitating factor for delirium; however, the effect of physical restraint on delirium, such as duration, number and appliance is still unclear. **DESIGN** A nested case-control study. **METHODS** A cohort of 593 intensive care unit patients were observed for 12 months, and 447 of them who received physical restraint were included for analysis. Delirium was assessed using the Confusion Assessment Method for the intensive care unit. During hospitalisation in intensive care unit, newly-onset delirium patients (the delirium group), and nondelirium patients of similar age, same gender, and conditions of mechanical ventilation and sedative drug usage (the nondelirium group) were included as the matching criteria. Patient data were acquired by reviewing medical and nursing electronic records. **RESULTS** Among the 447 patients that had been physically restrained, 178 (39.8%) developed delirium. Delirium risk in patients with restraint  $\geq 6$  days was 26.30 times higher than in those  $< 6$  days. Patients who had two and three times of restraint had a 2.38-fold and 3.62-fold higher risk of delirium than those with one time of restraint. However, the appliance, site, time to apply and remove restraint had no effect on the incidence of delirium. **CONCLUSIONS** The incidence of delirium is high when patients use physical restraint. Duration and number of restraint are positively related to delirium. Restrictions on the use of restraint in intensive care unit are required to reduce the occurrence of delirium. **RELEVANCE TO CLINICAL PRACTICE** To reduce delirium risk of patients in intensive care unit, nurses need to assess the risk of physical restraint and consider alternative measures, thereby to achieve the minimisation of the use of restraint.

## Resuscitation

**Interprofessional Simulations Promote Knowledge Retention and Enhance Perceptions of Teamwork Skills in a Surgical-Trauma-Burn Intensive Care Unit Setting.**

**Author(s):** George, Katie L; Quatrara, Beth

**Source:** Dimensions of critical care nursing : DCCN; ; vol. 37 (no. 3); p. 144-155

**Publication Type(s):** Journal Article

**Abstract:**BACKGROUND The current state of health care encompasses highly acute, complex patients, managed with ever-changing technology. The ability to function proficiently in critical care relies on knowledge, technical skills, and interprofessional teamwork. Integration of these factors can improve patient outcomes. Simulation provides "hands-on" practice and allows for the integration of teamwork into knowledge/skill training. However, simulation can require a significant investment of time, effort, and financial resources. The Institute of Medicine recommendations from 2015 include "strengthening the evidence base for interprofessional education (IPE)" and "linking IPE with changes in collaborative behavior." In one surgical-trauma-burn intensive care unit (STBICU), no IPE existed. The highly acute and diverse nature of the patients served by the unit highlights the importance of appropriate training. This is heightened during critical event situations where patients deteriorate rapidly and the team intervenes swiftly. PURPOSE The aims of this study were to (1) evaluate knowledge retention and analyze changes in perceptions of teamwork among nurses and resident physicians in a STBICU setting after completion of an interprofessional critical event simulation and (2) provide insight for future interprofessional simulations (IPSs), including the ideal frequency of such training, associated cost, and potential effect on nursing turnover. DESIGN A comparison-cohort pilot study was developed to evaluate knowledge retention and analyze changes in perceptions of teamwork. METHODS A 1-hour critical event IPS was held for nurses and resident physicians in a STBICU setting. A traumatic brain injury patient with elevated intracranial pressure, rapid deterioration, and cardiac arrest was utilized for the simulation scenario. The simulation required the team to use interventions to reduce elevated intracranial pressure and then perform cardiac resuscitation according to Advanced Cardiac Life Support guidelines. A semistructured debriefing guided by the TENTS tool highlighted important aspects of teamwork. Participants took knowledge and Teamwork Skills Scale (TSS) pretests, posttests, and 1-month posttests. Mean scores were calculated for each time point (pre, post, and 1-month post), and paired t tests were used to evaluate changes. RESULTS Mean knowledge test and TSS scores both significantly increased after the simulation and remained significantly elevated at 1-month follow-up. Participants recommended retraining intervals of 3 to 6 months. Cost of each simulation was estimated to be \$324.44. Analysis of nursing turnover rates did not demonstrate a statistically significant reduction in turnover; however, confounding factors were not controlled for. CONCLUSIONS Significant improvements on both knowledge test and TSS scores demonstrate the effectiveness of the intervention, and retention of the information gained and teamwork skills learned. Participants valued the intervention and recommended to increase the frequency of training. Future studies should develop a framework for "best practice" IPS, analyze the relationship with nursing turnover, and ultimately seek correlations between IPS and improved patient outcomes.

### **Organ support therapy in the intensive care unit and return to work in out-of-hospital cardiac arrest survivors-A nationwide cohort study**

**Author(s):** Riddersholm S.; Rasmussen B.S.; Kragholm K.; Torp-Pedersen C.; Mortensen R.N.;

**Source:** Resuscitation; 2018

**Publication Type(s):** Article In Press

**Abstract:**Aim: With increased survival after out-of-hospital cardiac arrest (OHCA), impact of the post-resuscitation course has become important. Among 30-day OHCA survivors, we investigated associations between organ support therapy in the Intensive Care Unit (ICU) and return to work. Methods: This Danish nationwide cohort-study included 30-day-OHCA-survivors who were employed prior to arrest. We linked OHCA data to information on in-hospital care and return to work. For patients admitted to an ICU and based on renal replacement therapy (RRT), cardiovascular support and mechanical ventilation, we assessed the prognostic value of organ support therapies in multivariable Cox regression models. Results: Of 1087 30-day survivors, 212 (19.5%) were treated in an ICU with 0-1 types of organ support, 494 (45.4%) with support of two organs, 26 (2.4%) with support of three organs and 355 (32.7%) were not admitted to an ICU. Return to work increased with

decreasing number of organs supported, from 53.8% (95% CI: 49.5-70.1%) in patients treated with both RRT, cardiovascular support and mechanical ventilation to 88.5% (95% CI: 85.1-91.8%) in non-ICU-patients. In 732 ICU-patients, ICU-patients with support of 3 organs had significantly lower adjusted hazard ratios (HR) of returning to work (0.50 [95% CI: 0.30-0.85] compared to ICU-patients with support of 0-1 organ. The corresponding HR was 0.48 [95% CI: 0.30-0.78] for RRT alone. Conclusions: In 30-day survivors of OHCA, number of organ support therapies and in particular need of RRT were associated with reduced rate of return to work, although more than half of these latter patients still returned to work. Copyright © 2018 Elsevier B.V.

### **Intracranial hemorrhage in HELLP syndrome patients admitted to the ICU**

**Author(s):** Yuyen T.; Kongsayreepong S.; Piriyaatsom A.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: Intracranial hemorrhage is a rare & serious complication with high mortality of HELLP syndrome (hemolysis, elevated liver enzymes & low platelet count). The aim of this study is to find the significant predictor of intracranial bleeding in the HELLP syndrome patient admission to the ICU. Methods: This prospective observational study was done in all obstetric patients admission to the general SICU of a tertiary university hospital during Jan 2013-Oct 2017. Data recording include patient demographic data, comorbidities, parity, ASA status, perioperative antihypertensive medication & BP, intraoperative blood loss, type & amount of fluid/blood & blood component, perioperative data: Hb, platelet count, liver function, coagulogram (PT, INR, fibrinogen), perioperative adverse event, ventilator/ICU days & ICU mortality. Results: There were 115 HELLP patients out of 422 obstetric patients admitted to the ICU. 19 HELLP patients (16%) developed intracranial hemorrhage during ICU admission with the severity started from small to massive intracranial hemorrhage who need craniotomy with clot removal. 17 patients (36%) die. One patient survived from massive intracranial hemorrhage after wide craniectomy & therapeutic hypothermia went home with mild hemiparesis. 3 patients developed intracranial hemorrhage on the day 3-4 after delivery. All patients still have elevated liver enzyme during hemorrhage. HELLP patients who had intracranial hemorrhage were significant ( $p < 0.05$ ) older, poor perioperative blood pressure control, lower platelet and fibrinogen, higher INR ratio & liver enzyme. Conclusions: Intracranial hemorrhage in HELLP patient is a high morbidity & mortality. Tight BP control & correction of platelet, fibrinogen, INR are needed during the peripartum period until the liver dysfunction come back to normal.

### **The effect of fluid overload on length of stay ICU and duration of mechanical ventilation after cardiac surgery**

**Author(s):** Benito L.D.; Haenen J.; Koopmans M.; Koetsier P.; De Widt E.; Boerma E.C.

**Source:** Critical Care; 2018; vol. 22

**Publication Date:** 2018

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: Although fluid therapy remains the foundation of shock resuscitation, fluid overload is associated with longer mechanical ventilation, renal failure and even mortality. Therefore, the benefit of fluid expansion associated with increased cardiac output and tissue perfusion should be balanced against the risk of pulmonary and tissue edema. The aim of this study is to investigate the effect of fluid overload on mechanical ventilation and length of stay in the Intensive Care Unit (LOS ICU) in post-cardiac surgery patients. Methods: In this retrospective single-

center observational study the fluid balance, after 12 hours of ICU admission of post-cardiac surgical patients, were evaluated. The LOS ICU and the duration of mechanical ventilation until the first extubation were recorded. Fluid balances (FB) were divided into quartiles and the 75th percentile was defined as high FB. Results: 750 patients were included. The duration of mechanical ventilation and LOS ICU both increased noticeably in the fourth quartile compared to the first 3 quartiles (see Figs. 1 and 2). Moreover, for every liter increase in fluid balance there was an associated 1.5 risk increase of having prolonged mechanical ventilation, and a two-fold risk of extended LOS ICU (Tables 1 and 2). Conclusions: Fluid overload in post-cardiac surgery patients is independently associated with prolonged mechanical ventilation and extended LOS ICU. (Table presented) (Figure presented).

### **Predictive factors for secondary ICU admission within 48 hours after hospitalization in a medical wards from the emergency room**

**Author(s):** De Abreu M.C.; Herminger S.; Hausfater P.; Rousseau A.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: The characterization of clinical and/or biological variables found in the emergency room predictive of a secondary admission in ICU would help to improve the identification of patients at risk of aggravation in order to avoid the associated consequences, such as, an increased mortality and increased hospital stay. Methods: This is a retrospective monocentric study of 3 years with patients admitted secondarily to a medical ICU within 48 hours of admission to the general wards from the emergency department in the Pitie-Salpetriere hospital in Paris. Each case was matched to 2 controls. 62 different variables were collected in the emergency room. Results: 319 patients, of whom 107 were cases and 212 controls were studied. Pneumonia is the diagnosis the most frequent in cases followed by sepsis (in 23 and 16%, respectively). 6 predictive factors of a secondary transfer in resuscitation are found: smoking status ( $p = 0.0205$ ) if active smoker - OR 0.390 (IC 0.11-1.35), if old smoker - OR 5.64 (IC 1.47-21.62); the emergency consulting motif, ( $p = 0.001$ ), if dyspnea - OR 20.39 (IC 4.03- 103.19), if fever - OR 7.61 (IC 1.53-37.75); the MEDS score  $\geq 7$  ( $p = 0.037$ ) - OR 0.31 (IC 0.10-0.93); the IGS2 score ( $p < 0.0001$ ) - OR 1.13 (IC 1.06-1.20); ( $P = 0.001$ ), taking an advice to an ICU: if the answer is to continue the care in the ward - OR 8.13 (IC 2.41-27.38), if the response is to not resuscitation - OR 0.14 (CI 0.01-2.24); and demanding a blood gas ( $p < 0.0001$ ) - OR 7.60 (IC 2.78-20.77). Conclusions: The risk of being admitted secondarily to intensive care is higher if patients consult for dyspnea or fever, if they are old smokers, if they have a high IGS2 score, if an arterial blood gas is requested and if an ICU medical advice is taken. The MEDS score under 7 and being an active smoker seems to be protects for the unexpected transfer.

### **Clinical profile of patients admitted to ICU due to acute poisoning**

**Author(s):** Moreno M.P.B.; Balsera E.C.; Gonzalez M.C.M.; Jimenez S.J.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: Patients suffering from acute intoxication, whether voluntarily for autolytic or accidental purposes, often require life support in intensive care units. Methods: Retrospective observational study of all patients admitted for acute intoxication who required admission to the ICU of the Regional Hospital of Malaga between January 2012 and August 2016, older than 14 years with admission to the ICU for intoxication of any kind. We study patient characteristics in terms of age, sex and medical history, type of toxicity, severity and evolution in our unit. Results: We found 70 cases of patients who required admission to the ICU due to acute intoxication, of which 55.6% were

women. The average age was 47.36 (standard deviation 18.22). The average stay in ICU was 5.04 (standard deviation 8.09). 54.2% of patients had a psychiatric history. As other background highlights, 19.4% were addicted to illegal drugs and 25% were hypertensive. Most patients took more than one toxic 83.3% and intoxication was voluntary in 84.7% versus accidental in 12.5% of cases. The toxic was known in 68%. The most used benzodiazepines in 26.4% of the total. The main cause of admission to the ICU was due to neurological deterioration in 49 of the cases registered and mechanical ventilation was necessary in 44 patients. The maximum time in mechanical ventilation was 34 days. The infection occurred in 24.3%, with the majority being respiratory infection. The 4.7% died in ICU. The hospital stay presented an average of 9.3 days. Conclusions: The profile of a patient admitted to the ICU due to acute intoxication is that of a woman of middle age and psychiatric history, with voluntary intoxication of several toxic substances and requiring mechanical ventilation for a low level of consciousness for an average of 3 days. The survival is very high and it would be necessary to analyze the possible relapses of these patients.

### **Quality improvement efforts to streamline ed to burn icu time in a level 1 trauma center**

**Author(s):** George T.C.; Garrett A.; Stephen S.; Steen A.; McNutt M.K.; Prater S.J.; Cross J.M.

**Source:** Journal of Burn Care and Research; Apr 2018; vol. 39

**Publication Type(s):** Conference Abstract

**Abstract:**Introduction: Prolonged stay in the emergency department (ED) has been linked to increased length of stay (LOS), death, adverse in-hospital events, and increased admission rates. Early initiation of burn care within a verified burn center intensive care unit (ICU) can help lessen adverse burn outcomes, such as over-resuscitation, pulmonary edema, hypovolemia, and compartment syndrome. Methods: During our monthly Quality Improvement (QI) Committee meetings, we identified an ED to burn ICU LOS of 2 hrs 26 min, for fiscal year (FY) 2016. Using Lean Methodology and the PDCA (plan-do-check-act) cycle, we initiated a performance improvement (PI) project aimed at decreasing our ED to burn ICU LOS to 1 hr 30 min, for the FY 2017 and beyond. During this process, we identified performance improvement gaps, barriers, root causes, and countermeasures for decreasing the LOS. Bed capacity, ED, trauma, and burn physician direction, and poor communication amongst ED nurses, Burn ICU nurses, and bed control were the main obstacles that we identified and targeted. Finally, we utilized our QI Committee meetings and two PDCA cycles, to reassess the ongoing process, implementing necessary changes to reach our set goal. Results: After the initiation of the PI project in October 2017, our ED to burn ICU LOS ranged from 1 hr 10 min to 1 hr 58 min, between October 2017 and June 2017, with the exception of an outlier of 3 hrs 54 min in March 2017. These outcomes were markedly improved when compared to our FY 2016 LOS of 2 hrs 26 min (Figure). The outlier was due to 1 burn patient with a delayed LOS due to bed capacity and a burn diversion status. Conclusions: Performance improvement projects, the utilization of QI Committee meetings, Lean Methodology and the PDCA cycle, can be useful for decreasing ED to burn ICU LOS. Although positive changes have been seen, this project requires continued monitoring and assessment.

### **Limitation of life support techniques at admission to the intensive care unit: A multicenter prospective cohort study**

**Author(s):** Rubio O.; Arnau A.; Cano S.; Subira C.; Balerdi B.; Perea M.E.; Fernandez-Vivas M.

**Source:** Journal of Intensive Care; Apr 2018; vol. 6 (no. 1)

**Publication Type(s):** Article

Available at [Journal of Intensive Care](#) - from PubMed Central

**Abstract:**Purpose: To determine the frequency of limitations on life support techniques (LLSTs) on admission to intensive care units (ICU), factors associated, and 30-day survival in patients with LLST

on ICU admission. Methods: This prospective observational study included all patients admitted to 39 ICUs in a 45-day period in 2011. We recorded hospitals' characteristics (availability of intermediate care units, usual availability of ICU beds, and financial model) and patients' characteristics (demographics, reason for admission, functional status, risk of death, and LLST on ICU admission (withholding/withdrawing; specific techniques affected)). The primary outcome was 30-day survival for patients with LLST on ICU admission. Statistical analysis included multilevel logistic regression models. Results: We recruited 3042 patients (age 62.5 +/- 16.1 years). Most ICUs (94.8%) admitted patients with LLST, but only 238 (7.8% [95% CI 7.0-8.8]) patients had LLST on ICU admission; this group had higher ICU mortality (44.5 vs. 9.4% in patients without LLST;  $p < 0.001$ ). Multilevel logistic regression showed a contextual effect of the hospital in LLST on ICU admission (median OR = 2.30 [95% CI 1.59-2.96]) and identified the following patient-related variables as independent factors associated with LLST on ICU admission: age, reason for admission, risk of death, and functional status. In patients with LLST on ICU admission, 30-day survival was 38% (95% CI 31.7-44.5). Factors associated with survival were age, reason for admission, risk of death, and number of reasons for LLST on ICU admission. Conclusions: The frequency of ICU admission with LLST is low but probably increasing; nearly one third of these patients survive for  $\geq 30$  days. Copyright © 2018 The Author(s).

### **Crterios de ingreso hospitalario y en la Unidad de Cuidados Intensivos de un paciente septico** **Hospital and intensive care unit admission criteria for the septic patient**

**Author(s):** Bernal M.H.; Martin M.J.A.; Lucas E.H.D.; Martin B.C.

**Source:** Medicine (Spain); Apr 2018; vol. 12 (no. 52); p. 3110-3113

**Publication Type(s):** Article

**Abstract:**Introduction: The incidence of sepsis continues increasing. It's defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. Diagnosis: A new scale is introduced, useful for the recognition of sepsis in patients not admitted to the ICU, called quick-SOFA. Sepsis and septic shock are medical emergencies and the treatment should be initiated immediately, with the highest priority and consensual and continuous care, between the emergency and ICU services. Treatment: In the first contact, assessment according to ABCD scheme, that of being altered, early warning to UCI and initiate simultaneous measures. According to the Surviving Sepsis Campaign, early resuscitation with crystalloids, sampling for culture and antibiotic therapy, and determination of lactic levels should be initiated. It requires frequent reassessment of the hemodynamic situation and continuous assessment of response to implanted measures. In the absence of response to the volume should be admitted to Intensive Care Medicine. Copyright © 2018

### **Impact of a stay in the intensive care unit on the preparation of Advance Directives: Descriptive, exploratory, qualitative study**

**Author(s):** Andreu P.; Dargent A.; Large A.; Meunier-Beillard N.; Leiva-Rojas U.; Prin S.; Charles P.-E.; Quenot J.-P.; Vinault S.; Fournel I.; Ecartot F.; Rigaud J.-P.

**Source:** Anaesthesia Critical Care and Pain Medicine; Apr 2018; vol. 37 (no. 2); p. 113-119

**Publication Type(s):** Article

**Abstract:**Background: Our objective was to assess, through a qualitative, exploratory study, the thought processes of patients regarding the formulation of advance directives (AD) after a stay in the ICU. Methods: The study was conducted from May to July 2016 using telephone interviews performed by four senior ICU physicians. Inclusion criteria were: patients discharged from ICU to home > 3 months earlier. Semi-directive interviews with patients focused on 5 main points surrounding AD. Results: In total, among 159 eligible patients, data from 94 (59%) were available for analysis. Among all those interviewed, 83.5% had never heard of "advance directives". Only 2% had

executed AD before ICU admission, and 7% expressed a desire to prepare AD further to their ICU stay. Among the barriers to preparation of AD, lack of information was the main reason cited for not executing AD. Patients noted the following in their AD: withdrawal of life-support in case of vegetative/minimally conscious state or when there is no longer any hope, in case of uncontrollable pain, and if impossible to wean from mechanical ventilation. Conclusion: The ideal time to engage patients in these discussions is most likely well before an acute health event occurs, although this warrants further investigation both before and after ICU admissions. Copyright © 2017 Societe francaise d'anesthesie et de reanimation (Sfar)

### **A nationwide analysis of intensive care unit admissions, 2009-2014 - The Korean ICU National Data (KIND) study**

**Author(s):** Park J.; Jeon K.; Chung C.R.; Yang J.H.; Cho Y.H.; Cho J.; Park C.-M.; Park H.; Suh G.Y

**Source:** Journal of Critical Care; Apr 2018; vol. 44 ; p. 24-30

**Publication Type(s):** Article

**Abstract:** Purpose: To evaluate unbiased information on the characteristics, procedures, and outcomes of intensive care unit (ICU) admissions in a long-term nationwide study. Materials and methods: Cohort study of all ICU admissions in patients > 18 years of age in Korea between August 1, 2009 and September 30, 2014 (1,553,673 ICU admissions in 1,265,509 patients). Results: From August 2009 to September 2014, the age-standardized ICU admission rate was 744.6 per 100,000 person-years (869.5 per 100,000 person-years in men and 622.0 per 100,000 person-years in women). The overall in-hospital mortality was 13.8% (14.1% in men and 13.5% in women). Among all Koreans, the ICU mortality rate was 102.9 per 100,000 person-years (122.5 per 100,000 person years in men and 83.8 per 100,000 person years in women). The median ICU and hospital length of stay were 4 and 13 days, respectively. The median cost per ICU admission was \$5051, which increased steadily over the study period. There were marked differences by gender in ICU admission rates, aggressive support, and outcomes. Conclusions: Our study identified increasing trends in ICU admissions and utilization of advance life support systems that add to the burden of care in a developed society. Copyright © 2017 Elsevier Inc.

### **Knowledge and Attitude of ER and Intensive Care Unit Physicians toward Do-Not-Resuscitate in a Tertiary Care Center in Saudi Arabia: A Survey Study.**

**Author(s):** Gouda, Alaa; Alrasheed, Norah; Ali, Alaa; Allaf, Ahmad; Almudaiheem, Najd; Ali, Youssuf;

**Source:** Indian Journal of Critical Care Medicine; Apr 2018; vol. 22 (no. 4); p. 214-222

**Publication Type(s):** Academic Journal

Available at [Indian Journal of Critical Care Medicine](#) - from Europe PubMed Central - Open Access

**Abstract:** Introduction: Only a few studies from Arab Muslim countries address do-not-resuscitate (DNR) practice. The knowledge of physicians about the existing policy and the attitude towards DNR were surveyed. Objective: The objective of this study is to identify the knowledge of the participants of the local DNR policy and barriers of addressing DNR including religious background. Methods: A questionnaire has been distributed to Emergency Room (ER) and Intensive Care Unit (ICU) physicians. Results: A total of 112 physicians mostly Muslims (97.3%). About 108 (96.4%) were aware about the existence of DNR policy in our institute. 107 (95.5%) stated that DNR is not against Islamic. Only (13.4%) of the physicians have advance directives and (90.2%) answered they will request to be DNR if they have terminal illness. Lack of patients and families understanding (51.8%) and inadequate training (35.7%) were the two most important barriers for effective DNR discussion. Patients and families level of education (58.0%) and cultural factors (52.7%) were the main obstacles in initiating a DNR order. Conclusions: There is a lack of knowledge about DNR policy which makes the optimization of DNR process difficult. Most physicians wish DNR for themselves and their

patients at the end of life, but only a few of them have advance directives. The most important barriers for initializing and discussing DNR were lack of patient understanding, level of education, and the culture of patients. Most of the Muslim physicians believe that DNR is not against Islamic rules. We suggest that the DNR concept should be a part of any training program.

## End of Life Care

### Changing thoughts about end-of life care in the ICU; Results of a survey

**Author(s):** Kikuchi M.; Yaguchi A.; Kang M.; Saito M.; Tsunoda M.; Oshiro T.; Kim A.; Shibahara K.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: The decision of end-of-life care in the ICU is very tough issue because the law, ethics, traditions and futility should be concerned involving family's will. Especially, stop or withdraw therapy is a quite difficult operation in Japan because of our traditions. Recently there are few legal issues due to some guidelines. Our hypothesis is some difference over time exists in thoughts about end-of-life care in the ICU. The purpose of this study is to know changing Methods: A questionnaire survey, which consists of 11 questions with 5 optional answers related to the thoughts of participants about end-of-life care of hopeless or brain death patients, was performed to nurses and doctors in our ICU. The questions were; whether accept to withdraw therapy or not and with family's will, whether positive or not to donate of organs from brain death patient, necessary of ICU care for brain death patient, feel guilty and stress for doing stop or withdraw therapy. The optional answer has 5 gradations from 'Yes' to 'No' for all questions. It was guaranteed to be anonymous for them in the data analysis. We conducted entirely same survey in 2012. The answers between in 2012 and in 2017 were compared. Mann-Whitney U test was used for statistical analysis. A  $p < 0.05$  was considered statistically significant. Results: There were total 51 participants (32 nurses and 19 doctors) in 2012 and 42 participants (23 nurses and 19 doctors) in 2017. The acceptances of withdraw therapy in nurses were significantly decreased in 2017 than in 2012 (40% vs. 83%, 53% vs. 83%,  $p < 0.05$ , respectively), while no changed in doctors. The positive of organ transplantation from brain death was also decreased in nurse in 2017 than in 2012 (43% vs. 80%,  $p < 0.05$ ). The feel guilty for withdraw therapy in nurses was also significantly decreased in 5 years (10% vs. 30%,  $p < 0.05$ ). Conclusions: Some of end-of-life thoughts in the ICU were shown differences in nurses compared with 5 years ago.

### Ethicus end-of-life practices (EOLP) in worldwide intensive care units (ICUs)- the ethicus II study

**Author(s):** Avidan A.; Sprung C.L.; Baras M.; Ricou B.; Michalsen A.; Feldman C.; Anstey M.; Weiss M.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: Substantial variability in EOLP occurs around the world [1]. Differences in EOLP were previously reported in Europe in the Ethicus I study [2]. Methods: ICUs worldwide were invited to participate through their country societies. Consecutive admitted ICU patients who died or had treatments limitations during a 6 month period from 1.9.2015 to 30.9.16 were prospectively studied. Regions included North, Central and Southern Europe (NE, CE, SE), North and Latin America (NA, LA), Asia (As), Australia (Au) and Africa (Af). Previous EOLP definitions were used [2]. Results: 199 ICUs in 36 countries participated enrolling 12, 857 patients. Figure 1 shows differences in EOLP by region and Figure 2 in patient competency by region. Conclusions: Worldwide differences



included more CPR in Af, LA, and SE and less CPR in NE, Au and NA. There was more withdrawing (WD) in NE and Au and less WD in LA and Af. More patients were competent in Au and NE and less were competent in Af, SE and LA. (Figure presented).

### **Changes in end-of-life practices (EOLP) in European intensive care units (ICUs)- the Ethicus II study**

**Author(s):** Busse L.; Hartog C.; Ricou B.; Michalsen A.; Feldman C.; Levin P.; Baras M.; Avidan A.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: This study evaluated differences in EOLP after 15 years in European ICUs that also participated in the Ethicus I study [1]. Methods: All previous Ethicus I centers were invited to participate in the Ethicus II study. Consecutive admitted ICU patients who died or had treatment limitations during a 6 month period from 1.9.2015 to 30.9.16 were prospectively studied. Previous EOLP and region definitions were used [1]. EOLP in the different regions of the Ethicus I study [1] were compared to the same ICUs in the Ethicus II study. Results: 22 of the original 37 ICUs participated again in this study. Figure 1 shows the differences in EOLP by region. Figure 2 notes differences in patient mental competency at the time of decision, information about patient's wishes and patient discussions in both Ethicus studies. Conclusions: Changes included less CPR (especially in the South) with more withholding and withdrawing therapies. There was a greater number of competent patients with discussions and knowledge of their wishes. (Figure presented).

### **A multidisciplinary approach at the emergency department to admit potential organ donors for end-of-life care to the intensive care unit**

**Author(s):** Witjes M.; Van Der Hoeven H.; Abdo F.; Kotsopoulos A.; Otterspoor L.; Herold I.

**Source:** Critical Care; 2018; vol. 22

**Publication Type(s):** Conference Abstract

Available at [Critical Care](#) - from PubMed Central

**Abstract:**Introduction: The aim of the present study is to improve the recognition of potential organ donors by implementing a multidisciplinary approach for organ donation at the emergency department (ED) [1]. Methods: In a prospective intervention study, we implemented this approach in six hospitals in the Netherlands. When the decision to withdraw life sustaining treatment was made at the ED in patients with a devastating brain injury without contra indications for organ donation, an Intensive Care Unit (ICU) admission for end-of-life care was considered. Every ICU admission for end-of-life care was evaluated. Interviews were conducted with emergency physicians, neurologists and ICU physicians according to a standardized questionnaire. This interview focused on medical decisions that were made and difficulties arising during hospitalization. Results: From 1 January 2016 to November 2017 data were collected on the number of patients admitted to the ED with acute brain injury. In total, 50 potential organ donors were admitted to the ICU for end-of-life care. Donation was either requested in the ED (12%), ICU (78%), neurology department (4%), or donation was not requested (6%). Out of 48 donation requests, 26 families (51%) consented to donation. This led to 21 successful organ transplantations. In four of these 21 patients family consent was obtained to intubate them solely for the purpose of organ donation. The most important points raised during the interviews were: explaining the non-therapeutic ICU admission to the family, the location where donation should be requested (ED/ICU) and utility of ICU resources. Conclusions: A close collaboration between the ED, neurology department and ICU is necessary and achievable in order not to miss potential organ donors in patients with acute brain injury with a futile prognosis in the ED.

**Attitudes towards end-of-life issues in intensive care unit among Italian anesthesiologists: a nation-wide survey.**

**Author(s):** Cortegiani, Andrea; Russotto, Vincenzo; Raineri, Santi Maurizio; Gregoretti, Cesare

**Source:** Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer; Jun 2018; vol. 26 (no. 6); p. 1773-1780

**Publication Type(s):** Journal Article

**Abstract:**BACKGROUNDThe aim of this paper is to collect data on the practice of palliative care, withholding and withdrawal of life-sustaining therapies, and management of end of life (EOL) in Italian intensive care units (ICUs).METHODSWeb-based survey among Italian anesthesiologists endorsed by the Italian Society of Anesthesiology Analgesia Reanimation and Intensive Care (SIAARTI). The survey consists of 27 close-ended and 2 open-ended questions.RESULTSEight hundred and five persons responded to the full list of questions. The highest proportion of respondents was of 36-45 years of age (34%) and catholic (66%). Almost 70% of responders declared that palliative/supportive care are applied in their ICU in case of futility of intensive treatments. Decision on withdrawing/withholding of life-sustaining treatments resulted from team consensus in most cases (58%). In more than 70% of responders' ICUs, there is no collaboration with palliative/supportive care experts. Systematic recording of most frequent symptoms experienced by critically ill patients (e.g., pain, dyspnea, thirst) was not common. Vasopressors, extracorporeal therapies, blood component transfusions and invasive monitoring were the most commonly modified/interrupted measures in case of futility. Almost 85% of respondents have not received training in palliative/supportive care. The proportion of respondents whose institution has a palliative care team and who had training in palliative care was not homogenous across the country.CONCLUSIONSThese data suggest that training in palliative care and its clinical application should be implemented in Italy. Efforts should be made to improve and homogenize the management of dying patients in ICU.

**ENSURING BREATHING COMFORT AT THE END OF LIFE: THE INTEGRAL ROLE OF THE CRITICAL CARE NURSE.**

**Author(s):** Campbell, Margaret L.

**Source:** American Journal of Critical Care; May 2018; vol. 27 (no. 3); p. 171-171

**Publication Type(s):** Academic Journal

Available at [American Journal of Critical Care](#) - from EBSCO (CINAHL Plus with Full Text)

**Abstract:**The article discusses the integral role of critical care nurses in assessing and treating dyspnea during the trajectory of critical care illness when a patient is not expected to survive and care goals are shifted to focus on comfort.

**Staff and family response to end-of-life care in the ICU.**

**Author(s):** Hartog, Christiane S; Reinhart, Konrad

**Source:** Current opinion in anaesthesiology; Apr 2018; vol. 31 (no. 2); p. 195-200

**Publication Type(s):** Journal Article

Available at [Current Opinion in Anaesthesiology](#) - from Ovid (Journals @ Ovid) - Remote Access

**Abstract:**PURPOSE OF REVIEWEnd-of-life (EOL) care can be stressful for clinicians as well as patients and their relatives. Decisions to withhold or withdraw life-sustaining therapy vary widely depending on culture, beliefs and organizational norms. The following review will describe the current understanding of the problem and give an overview over interventional studies.RECENT FINDINGSEOL care is a risk factor for clinician burnout; poor work conditions contribute to emotional exhaustion and intent to leave. The impact of EOL care on families is part of the acute Family

Intensive Care Unit Syndrome (FICUS) and the Post Intensive Care Syndrome-Family (PICS-F). Family-centered care (FCC) acknowledges the importance of relatives in the ICU. Several interventions have been evaluated, but evidence for their effectiveness is at best moderate. Some interventions even increased family stress. Interventional studies, which address clinician burnout are rare. SUMMARY EOL care is associated with negative outcomes for ICU clinicians and relatives, but strength of evidence for interventions is weak because we lack understanding of associated factors like work conditions, organizational issues or individual attitudes. In order to develop complex interventions that can successfully mitigate stress related to EOL care, more research is necessary, which takes into account all potential determinants.

**Comfort At The Crossroads: Service, Therapy and Emotional Support Animals In The ICU And At The End-of-Life.**

**Author(s):** Martin, Niels; Pascual, Jose L; Crowe, Dennis; Toevs, Christine; Cereda, Maurizio F

**Source:** The journal of trauma and acute care surgery; Mar 2018

**Publication Type(s):** Journal Article

**Abstract:**The US has witnessed a vast increase in animals in therapeutic roles. These roles include Service as defined by the American Disabilities Act (ADA) as well as other animal types that are not covered under the ADA provisions. Such animal roles are designated as Therapy animals and Emotional Support animals (ESA). Understanding the legal and regulatory requirements that govern how each animal type accesses healthcare facilities is essential in planning for their presence. Since only Service animals are required to be given access to facilities, individual institutions must plan for how to accommodate their presence throughout different phases of care. Additionally, plans to incorporate Therapy animals, if so desired, should be articulated including requirements for training, health and certification prior to patient space access. ESA are not required to be granted facility access but are increasingly prevalent in public spaces and should drive healthcare facility policy generation to address allowing or prohibiting access. Finally, anticipated conflict between individual rights that cross along animal presence lines should be anticipated and proactively addressed instead of responding to conflict only after it has arisen. STUDY TYPE Review LEVEL OF EVIDENCE: N/A.

**Robust Evaluations of Intensive Care Unit Length of Stay Using Observational Data...Khandelwal N, Brumback LC, Halpern SD, et al.: Evaluating the economic impact of palliative and end-of-life care interventions on intensive care unit utilization and costs from the hospital and healthcare system perspective.**

**Author(s):** Garrido, Melissa M.

**Source:** Journal of Palliative Medicine; Mar 2018; vol. 21 (no. 3); p. 280-280

**Publication Type(s):** Academic Journal



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