

CRITICAL CARE ABSTRACTS

SAFETY STANDARDS FOR INTRAHOSPITAL TRANSFER OF CRITICAL CARE PATIENTS

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Introduction: The aim was to assess care of patients during intrahospital transfer. The UK Royal College of Anaesthetists has defined auditable standards for the care of patients and the training of escorting medical and nursing staff in this context.

Methods: Patients in a 27-bed combined general and neurosurgical critical care unit were studied in January 2011 and May 2012. Patients undergoing radiology department imaging or intervention were identified from the electronic imaging library. Records of these transfers were sought in the critical care electronic notes and the standards of documentation graded on a five-point scale (very good, good, average, minimal, absent). Documentation of the grade and training of escorting staff was also sought. Between the two study periods, a transfer safety checklist was introduced.

Results: A total of 20.9% of 143 patients underwent one or more transfers in January 2011 (40 transfers). In May 2012, 26.4% of 151 patients underwent 57 transfers. In the first period, documentation was graded as minimal (limited to a statement that the patient had left the critical care unit) or absent in 77.5% of transfers. In the 62.5% of patients transferred whilst on invasive ventilation, 88.0% had no documentation by the doctor and in 84.0% it was not known which doctor had escorted the patient. There was only slight improvement in the second period (71.9% minimal or absent documentation, 80.0% no documentation by the doctor, 72.0% not known which doctor escorted). In the documentation available, six severe complications were noted during the second period (including episodes of severe bradycardia, hypotension and pupil dilatation).

Conclusion: On average our unit conducts nearly two critical care transfers each day. Severe complications seem to complicate at least 10% of these, stressing the risk, need for good care and ongoing training. The intervention made in this audit had little impact on the standard of documentation. However, it has raised the issue within the consciousness of the staff. It is important to identify interventions that have failed to reach a gold standard to provide the impetus to seek other solutions. As a result of this study, the author has devised new hospital protocols and specific training courses to improve standards of transfer medicine locally. The study also identified our portable head CT scanner to have the potential to reduce transfers by 52% and so this has been strongly promoted.

Sleep, anxiety and fatigue in family members of patients admitted to the intensive care unit: a questionnaire study

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Introduction: Family members of critically ill patients often experience increased incidence of physical and mental health issues. One of the first ways family members suffer is by losing

sleep. The purpose of this study is to understand sleep quality, levels of fatigue and anxiety, and factors contributing to poor sleep in adult family members of critically ill patients.

Methods: A questionnaire was designed to evaluate sleep, fatigue and anxiety during the intensive care unit (ICU) admission. We incorporated three validated instruments: General Sleep Disturbance Scale (GSDS), Beck Anxiety Index (BAI) and Lee Fatigue Scale (NRS-F). Adult family members of patients in ICU for more than 24 hours were approached for questionnaire completion. Patient demographics were recorded.

Results: The study population consisted of 94 respondents, (49.1 ± 12.9 years, 52.7% male); 43.6% were children and 21.3% were spouses of ICU patients. Sleep quality was rated as poor/very poor by 43.5% of respondents, and good/very good by 15.2%. The most common factors contributing to poor sleep were anxiety (43.6%), tension (28.7%) and fear (24.5%). Respondents' most common suggestions to improve sleep were more information regarding the patient's health (24.5%) and relaxation techniques (21.3%). Mean GSDS score was 38.2 ± 19.3, with 58.1% of respondents experiencing moderate to severe sleep disturbance. Mean BAI was 12.3 ± 10.2, with 20.7% of respondents experiencing moderate to severe anxiety. Mean NRS-F was 3.8 ± 2.5, with 57.6% of respondents experiencing moderate to high fatigue. Family members who spent one or more nights in the hospital had significantly higher GSDS, BAI and NRS-F scores. The patient's Acute Physiology and Chronic Health Evaluation (APACHE) II score at survey completion correlated significantly with family members' GSDS, BAI and NRS-F.

Conclusion: The majority of family members of ICU patients experience moderate to severe sleep disturbance and fatigue, and mild anxiety.

Implementing a hand hygiene programme in the critical care department of galway university hospitals, Ireland: an interesting and challenging journey

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Antimicrob Resist Infect Control. 2013; 2(1): O84.*

Introduction: As a participant of the PROHIBIT (Prevention of Hospital Infections by Intervention and Training) study, we review interim outcomes and practical challenges after 18 months of implementing a hand hygiene programme in our critical care units.

Methods: Following a 6-month baseline audit, a multifaceted programme was instituted in July 2011. Regular audits tracked the programme's impact on outcomes. Factors impacting on the programme's implementation were collated from stakeholders' feedback and observations made by the implementation team. These factors were then used to further inform and adapt unit based interventions.

Results: There was a significant decrease in central venous catheter-related bloodstream infection (CRBSI) rates following the programme implementation. CRBSI rates fell from 5.4 infections / 1,000 CVC days (95% confidence interval (CI) 3.1 – 9.5) in the baseline period to 0.8 (95% CI 0.3 – 2.1) during the 18 months of the programme. Hand hygiene compliance rates rose from 48.8% (baseline period) to 77.2% during the period of programme implementation, with results maintaining above 75% in the latter 12 months (Jan – Dec 2012). Factors facilitating its implementation include institutional endorsement of outcome measures as key performance

indicators, regular feedback to stakeholders, targeted educational sessions, and bedside shadowing exercises. Challenges have also been encountered, eg. maintaining motivation and enthusiasm of staff, waning of the 'novelty' factor in the study, maintaining hand hygiene as a priority in challenging times, poorer compliance rates of visiting medical teams.

Conclusion: Participation in the PROHIBIT study gave us the impetus to implement an intensive hand hygiene programme in our critical care units. Although resource-intensive, it has been a success to date. The journey to improve hand hygiene compliance has also been one about shared vision and culture change. Our journey continues.

Implementation of the world health organization hand hygiene improvement strategy in critical care units

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Background: To determine hand hygiene compliance before and after an intervention campaign in critical care units, this study was carried out in the Intensive care unit (ICU), Neonatal intensive care unit (NICU), Burns unit (BU) and the Kidney unit of the King Abdul Aziz Specialist Hospital, Taif, Saudi Arabia. The observation using the WHO hand hygiene protocol took place in four phases with phase I, between April 24-May 06 2010 and phase II from May 29-June 09 2010. An educational intervention took place between the Phases I and II. Follow-up Phases III and IV were from 01–15 October 2010 and 15–30 March 2011 respectively.

Findings: 1,975 hand hygiene opportunities comprising of 409 in Phase I, 406 in Phase II, 620 in Phase III and 540 Phase IV were observed. Compliance rate was 67% pre-intervention, 81% in phase II, declining to 59% and 65% in phases III and IV. Increased compliance in the ICU from 39% in Phase I to 81% in Phase IV ($p < 0.05$) was sustained throughout the study. Highest compliance rates were recorded among nurses in all phases. The improved compliance for physicians observed in the post-intervention phase was lost in follow-up phases. Missed opportunities for hand hygiene were before patient contact, after touching patient's surrounding and before aseptic techniques. Team-work and leadership were identified as enhancing factors for compliance.

Conclusion: The WHO hand hygiene strategy combined with health education, continuous evaluation and team approach resulted in increased compliance but this was not sustained in certain critical care areas.

Steroid therapy in septic shock: survey of practice amongst UK critical care physicians

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Introduction: Corticosteroid (CS) therapy in sepsis remains controversial and was first introduced in sepsis management for its anti-inflammatory property. CS has found a role in septic shock amelioration with inconsistent outcomes. The Surviving Sepsis Campaign (SSC) includes CS as a Level 2C recommendation in septic shock [1]. Adapting and practicing SSC guidelines vary between critical care units. Accordingly, a survey was conducted to elucidate the usage of CS for septic shock by UK critical care physicians (CCPs).

Methods: Following approval by the UK Intensive Care Society (ICS), the survey was publicised on the ICS website and its newsletter.

Results: A total of 81 intensivists responded to this online survey. Seventy-four (92.5%) CCPs prescribed CS only if the septic shock is poorly responsive to fluid resuscitation and vasopressor therapy. Six (7.5%) initiated CS at the same time as vasopressor therapy. None initiated CS for patients with severe sepsis. No CS other than hydrocortisone is being used. The most commonly used intravenous regimen is 50 mg 6 hourly (65%) followed by 50 mg 8 hourly (11%). Only 10% of CCPs would prescribe it by infusion. Less commonly used regimens were 100 mg 8 hourly (6%) and 100 mg 6 hourly (5%). Only 5% would consider adding fludrocortisone. Prior to initiating CS, 5% of CCPs would perform a short synacthen test, while 94% would not. The majority (89%) of CCPs would stop CS after resolution of shock state or when vasopressor infusion is terminated whilst 11% after a fixed duration. Withdrawal of CS also differed, in that 25% tapered/weaned steroids, 31% stopped it abruptly and 44% of CCPs would base their CS cessation pattern on the clinical context. Only 46% of CCPs believe that CS is beneficial whereas 44% were unsure of the benefits in septic shock. Only 29 (36%) responders indicated that their critical care unit had a written protocol for CS in septic shock.

Conclusion: The perceptions, usage and cessation of CS in septic shock vary but do appear to have shifted in the last decade. A UK survey in 2003 identified that only 60% of ICUs used CS for septic shock and over 22% perform a short synacthen test [2]. It appears that many intensivists are using CS for septic shock, despite conflicting outcome data. We all strive to practice evidence-based medicine but until we have a robust, reliable and methodical randomised control trial that attempts to resolve the CS debate, practice will remain diverse on this subject, as reflected by our survey.

Predictors of cardiopulmonary arrest outcome in a comprehensive cancer center intensive care unit

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Background: Some comprehensive cancer centers in industrialized countries have reported improved outcomes in their cardiopulmonary arrest (CPA) patients. Little is known about the outcomes and predictors of CPA in cancer centers in other parts of the world. The objective of this study was to examine the predictors of CPA outcome in a comprehensive cancer center closed medical-surgical intensive care unit (ICU) located in Amman, Jordan.

Methods: In this retrospective single-center cohort study, we identified 104 patients who had a CPA during their stay in the ICU between 1/1/2008 and 6/30/2009. Demographic data and CPA-related variables and outcome were extracted from medical records. Comparisons between different variables and CPA outcome were conducted using logistic regression.

Results: The mean age of the group was 49.7 ± 15.3 years. The mean APACHE II score was 23.7 ± 8.0 . Thirty six patients (34.6%) were resuscitated successfully but 8 of them (7.7% of the cohort) left the ICU alive and only 6 out of the 8 (5.8% of the cohort) left the hospital alive. The following variables predict resuscitation failure: acute kidney injury (OR 1.7, CI: 1.1 – 2.6), being on mechanical ventilation (OR 3.8, CI: 1.3 – 11), refractory shock (OR 4.7, CI: 1.8 – 12) and CPR duration (OR 1.1, CI: 1.1 – 1.2).

Conclusion: Survival among cancer patients who develop CPA in the ICU continues to be poor. Once cancer patients suffered a CPA in the ICU multiple factors predicted resuscitation failure but CPR duration was the only factor that predicted resuscitation failure and ICU as well as hospital mortality.

Invasive mechanical ventilation as a risk factor for acute kidney injury in the critically ill: a systematic review and meta-analysis

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Introduction: Mechanical ventilation (MV) is commonly regarded as a risk factor for acute kidney injury (AKI) in the critically ill. We investigated the strength of this association and whether settings of tidal volume (Vt) and positive end-expiratory pressure (PEEP) affect the risk for AKI.

Methods: We performed a systematic review and meta-analysis using studies found by searching MEDLINE, EMBASE, and references in relevant reviews and articles. We included studies reporting on a relation between the use of invasive MV and subsequent onset of AKI, or comparing higher with lower Vt or PEEP and subsequent onset of AKI. All studies clearly stating that MV was initiated after onset of AKI were excluded. We extracted the proportion with and without MV and AKI. We included 31 studies on invasive MV.

Results: The pooled odds ratio (OR) for the overall effect of MV on AKI was 3.16 (95% CI 2.32 to 4.28, $P < 0.001$). Nearly all subgroups showed that MV increases the risk for AKI. The pooled OR for studies with a multivariate analysis including MV as a risk factor for AKI was 3.58 (95% CI 1.85 to 6.92; $P < 0.001$). Different settings of Vt and PEEP showed no effect.

Conclusions: Invasive MV is associated with a threefold increase in the odds of developing AKI and various Vt or PEEP settings do not modify this risk. The latter argues in favour of a haemodynamic origin of AKI during MV.

Noninvasive ventilation immediately after extubation improves weaning outcome after acute respiratory failure: a randomized controlled trial

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Introduction: Noninvasive ventilation (NIV), as a weaning-facilitating strategy in predominantly chronic obstructive pulmonary disease (COPD) mechanically ventilated patients, is associated with reduced ventilator-associated pneumonia, total duration of mechanical ventilation, length of intensive care unit (ICU) and hospital stay, and mortality. However, this benefit after planned extubation in patients with acute respiratory failure of various etiologies remains to be elucidated. The aim of this study was to determine the efficacy of NIV applied immediately after planned extubation in contrast to oxygen mask (OM) in patients with acute respiratory failure (ARF).

Methods

A randomized, prospective, controlled, unblinded clinical study in a single center of a 24-bed adult general ICU in a university hospital was carried out in a 12-month period. Included patients met extubation criteria with at least 72 hours of mechanical ventilation due to acute respiratory failure, after following the ICU weaning protocol. Patients were randomized immediately before elective extubation, being randomly allocated to one of the study groups: NIV or OM. We compared both groups regarding gas exchange 15 minutes, 2 hours, and 24 hours after extubation, reintubation rate after 48 hours, duration of mechanical ventilation, ICU length of stay, and hospital mortality.

Results

Forty patients were randomized to receive NIV (20 patients) or OM (20 patients) after the following extubation criteria were met: pressure support (PSV) of 7 cm H₂O, positive end-expiratory pressure (PEEP) of 5 cm H₂O, oxygen inspiratory fraction (FiO₂) ≤ 40%, arterial oxygen saturation (SaO₂) ≥ 90%, and ratio of respiratory rate and tidal volume in liters (f/TV) < 105. Comparing the 20 patients (NIV) with the 18 patients (OM) that finished the study 48 hours after extubation, the rate of reintubation in NIV group was 5% and 39% in OM group ($P = 0.016$). Relative risk for reintubation was 0.13 (CI = 0.017 to 0.946). Absolute risk reduction for reintubation showed a decrease of 33.9%, and analysis of the number needed to treat was three. No difference was found in the length of ICU stay ($P = 0.681$). Hospital mortality was zero in NIV group and 22.2% in OM group ($P = 0.041$).

Conclusions

In this study population, NIV prevented 48 hours reintubation if applied immediately after elective extubation in patients with more than 3 days of ARF when compared with the OM group.

Anti-inflammatory effects of clarithromycin in ventilator-induced lung injury

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Background: Mechanical ventilation can promote lung injury by triggering a pro-inflammatory response. Macrolides may exert some immunomodulatory effects and have shown significant benefits over other antibiotics in ventilated patients. We hypothesized that macrolides could decrease ventilator-induced lung injury.

Methods: Adult mice were treated with vehicle, clarithromycin or levofloxacin, and randomized to receive mechanical ventilation with low (12 cmH₂O, PEEP 2 cmH₂O) or high (20 cmH₂O, ZEEP) inspiratory pressures for 150 minutes. Histological lung injury, neutrophil infiltration, inflammatory mediators (NFκB activation, *Cxcl2*, IL-10) and levels of adhesion molecules (E-selectin, ICAM) and proteases (MMP-9 and MMP-2) were analyzed.

Results: There were no differences among groups after low-pressure ventilation. Clarithromycin significantly decreased lung injury score and neutrophil count, compared to vehicle or levofloxacin, after high-pressure ventilation. *Cxcl2* expression and MMP-2 and MMP-9 levels increased and IL-10 decreased after injurious ventilation, with no significant differences among treatment groups. Both clarithromycin and levofloxacin dampened the increase in NFκB activation observed in non-treated animals submitted to injurious ventilation. E-selectin levels

increased after high pressure ventilation in vehicle- and levofloxacin-treated mice, but not in those receiving clarithromycin.

Conclusions: Clarithromycin ameliorates ventilator-induced lung injury and decreases neutrophil recruitment into the alveolar spaces. This could explain the advantages of macrolides in patients with acute lung injury and mechanical ventilation.