Icu case study

Education

Case StudyA 45 year old male was admitted to ICU following an exploratory laparotomy which showed a ruptured appendix and peritonitis. The procedure began as a laparoscopic cholecystectomy but the initial finding was pus throughout the peritoneal cavity and a normal gallbladder. An open exploratory laparotomy where a ruptured appendix was discovered which was removed and a washout was performed. The patient had a two day history of abdominal pain prior to his admission through A&E. He had no previous medical or surgical history. The patient smoked 20/day and drank alcohol at the weekends.

Once admitted to ICU, he was intubated and ventilated on bilevel ventilation and sedated with propofol and fentanyl. In theatre he received two litres of hartmanns solution as a fluid load, however in ICU was commenced on maintenance of normal saline at 100mls/hr. Feeding was ruled out on admission as it was thought that the patient would have extubated the following day. However, the patient was in ICU six days prior to extubation, therefore TPN was commenced. Noradrenaline was used for a MAP above 70mmhg rather than a fluid load. The patients clinical scenario was more in depth as outlined above.

However, these are outside the scope of this case study. The medical andnursinginterventions discussed in this assignment is mechanical ventilation, total parental nutrition and vasopressors. Mechanical Ventilation Bilevel ventilation is a relatively new setting. (Mireles-Cabodevila et al, 2009) The ventilator maintains a high pressure setting for the bulk of the respiratory cycle, which is followed by a release of low pressure. (Mireles-

Cabodevila et al, 2009) The release to a low PEEP is the expiration phase and aids the elimination of CO?.

The release periods are kept short to prevent derecruitment of alveoli and encourage spontaneous breathing. (Mireles-Cabodevilla et al, 2009) The advantages of bilevel include an increase in mean alveolar pressure with recruitment, haemodynamic and ventilatory benefits and reduced sedation requirements. (Putensen et al, 2006) Analgesia and sedation is not only used for pain relief andanxietybut for mechanical ventilation comfort. (Putensen et al, 2006) This level can reduced to aim of a Riker of 4, which a co-operative, responsive patient. Putensen et al, 2006) This reduces the need for more vasopressors to maintain a stable cardiovascular system. (Putensen et al, 2006) When first admitted the patients ventilatory settings were: FiO2 0. 4 Rate 12 HiPeep 22 LoPEEP 5 PS 10 CXR showed bibasal atelectasis/consolidation ABG - pH 7. 43 paCO? 33 paO? 74 HCO? 23 BE -0. 5 The pH is within normal limits, on the lower end, i. e. between 7. 35 - 7. 45. Therefore it is normal/alkalotic. The paCO? indicates an alkalotic range. This is used to assess the effectiveness of ventilation. (Coggon, 2008) PaO? is 74, which is low as normal range is 80-110, which shows hypoxemia.

PaO? is not interpreted in the patients acid-base status but indicates O? binding to haemoglobin. (Coggon, 2008) The HCO? is normal. The next step is to match the CO? , HCO? to the pH. The CO? and pH is on the alkalotic side of normal. Therefore it shows a respiratory disturbance. (Woodruff, 2009) The next step is to see if either compensation is occurring. To do this, the interpretor must look to see if either the CO? or HCO? go in the opposite direction of the pH. In which, in the ABG above, you can clearly see that it

does although the HCO? is within normal range, which means no compensation is occurring. Woodruff, 2009) The full diagnosis is uncompensated respiratory alkalosis with hypoaxemia. The patient is more than likely hyperventilating with poor gas exchange in view of the CXR. In response to this ABG result ventilatory setting were changed to: FiO2 0. 4 Rate 8 HiPEEP 22 LoPEEP 8 PS 14 ABG post setting change - pH 7. 39 paO? 103 paCO? 36 HCO? 22 The rate was changed as the patient was blowing off too much CO? with the rate of 12 plus any spontaneous breaths he was doing. The patients chest was rotten with a productive secretions and bibasal consolidation at the bases, seen in a repeat CXR.

Suctioning resulted in moderate to large amounts of white sputum. The patients wife stated that he had been suffering from a cold for one week prior to admission. Therefore an increase in PEEP (Hi and Lo) was required to recruit the alveoli and aid in good gas exchange. (Dellinger at al, 2007) It is recommended that positive end expiratory pressure is set to avoid extensive lung collapse on expiration. (Dellinger et al, 2007) Maintaining pressure and spontaneous breathing resulted in an increase in arterial oxygenation and helped prevent a deterioration in pulmonary gas exchange. Putensen et al 2006) Studies have been carried out to determine whether high PEEP increases patients outcomes. These include the ALVEOLI study and the Lung Open Ventilation (LOV). These studies do not show an improvement on mortality with the increase in PEEP however show a decrease in days on the ventilator. (Mercat et al 2008) The patients right side was worse than the left on the CXR and auscultation. Therefore he was being positioned right side up and his back on pressure area cares. Repositioning patients not only protects

the patients skin but it also improves gas exchange and decrease the risk of ventilator acquired pneumonia. Deutschmann and Neligan, 2010) Positioning the patient with the good lung down may improve paO? and aid in the drainage of secretion. (Deutschmann and Neligan, 2010) Elevating the head of the bed also aids recruitment of alveoli at the bases and again decreases the risk of ventilator acquired pneumonia. (Deutschmann and Neligan, 2010) All of the above interventions by nursing and medical staff were to improve the patients outcome and aid extubation once the patients chest improved and any other factors affecting the patients ability to self-ventilate. Total Parenteral Nutrition

It is seen as appropriate time-scale of 1 - 3 days that surgical patients commence normal diets. (Braga et al, 2009) As the patient was intubated and ventilated, no feeding was commenced until day three. The main goal of nutritional support is to avoid starvation in the aim to support post-operative recovery, and maintain the patients normal body functions. (Braga et al, 2009) Malnutrition decreases patients outcomes within the critical care setting. (Artinian et al, 2006) Total parenteral nutrition (TPN) was commenced at 40mls/hr as per the ICU Dr's orders.

The dietician reviewed the patient and suggested the goal rate was 81mls/hr, which the feed was slowly increased to over two days. this is because of the risk of referring syndrome. Refeeding syndrome is 'a syndrome consisting of metabolic disturbances that occur as a result of reinstitution of patients who have been starved or malnourished. ' (Shils et al, 2006) The medical and nursing team must keep a close eye on the patients bloods. Although this is standard practice with all patients in ICU.

Refeeding syndrome can cause a multitude of complications including, neurological, pulmonary, cardiac and hematologic. Assiotisa and Elenin, 2010) The use of the dietician greatly reduces the risk of over-feeding. (Ziegler, 2009) However, the consensus is the patients are underfed as medical teams are conservative in their approach of prescribing rates. (Faisy et al, 2009) Although the dieticians are heavily involved in the ICU that the patient in this study is, recent studies have shown that this is a good standard of care, as this helps doctors and nurses focus on early nutrition prescribed at the correct rate. (Faisy et al, 2009) The most used formulae used to predict goal rate is 25/kcal/kg ideal body weight. Braga et al, 2009) However in intubated patients, there is a fluctuating in 'resting energy expenditure' due to the use of sedatives, analgesics and vasopressors causing confusion over energy given and uptake. (Faisy et al, 2009) The bag of TPN the patient had is ?. This is appropriate as patients requiring TPN need a full range of vitamins and trace elements daily. (Braga et al, 2009) Enteral nutrition is widely used in ICU due to the increased risk of TPN induced catheter-related sepsis, cost and multi-organfailure. Faisy et al 2009) However, surgical patients are less likely to receive enteral nutrition compared to medical patients. (Elke et al, 2008) Previous studies investigating critical ill abdominal surgical patients suggested that early feeding is beneficial. (Artinian et al, 2006) Nevertheless, another report suggested it did more harm than good, resulting in an increase of infections. (Artinian et al, 2006) The current recommendations, is that patients whom are expected to commence a normal intake should be started on parenteral nutrition. Singer et al, 2009) The patient who was still sedated and ventilated at this stage falls under the recommendations. His bowel sounds were scant

and he did not have a bowel motion since admission. The surgeons were reluctant to commence feeding with the absence of bowel sounds. This is due to the fear of a paralytic ileum as peritonitis may cause this. (McClare et al, 2009) It is now acknowledged that gentle feeding may restore gut mobility and is recommended for early management. (McClare et al, 2009) The lack of sound evidence based practice results in a need for future studies on post-operative feeding. Lownfels, 2008) While the patient is on TPN, an insulin protocol in in place to monitor blood sugar levels second hourly and adjust insulin as required. There is a high risk of hyperglycaemia due to insulin resistance when the body is under increasedstress. (Braga et al, 2009) Therefore close glucose control is of benefit to the patients outcome in the ICU setting, including fewer infectious episodes and lower mortality. (Braga et al, 2009) A central line or another type of central access is recommended for the administration of TPN, as it can irate the veins in peripheral access. Singer et al, 2009) A study performed about the reliability of central venous lines and PICC lines came to the conclusion that the number of infections was the same, nevertheless, phlebitis and thrombus occurred more frequently in the PICC lines. (Singer et al, 2009) Feeding the patient is a complicated process and a close eye on the patient is needed is pick up on complications that may occur during the feeding regime. Once the patient was extubated. , he remained drowsy for a day and a half. Ammonia levels were done and these came back high. The TPN was stopped and the patient's mental status slowly improved.

The patients LFT's were normal. Vasopressors The patient is also being treated for an abdominal infection and community acquired pneumonia.

Septic shock is defined as an inflammatory response syndrome with a mean arterial pressure (MAP) of 70mmhg. Other factors affecting the cardiovascular system include sedatives. (Ray and McKeown, 2007) Therefore the systemic infection and sedatives are contributing to the patients low blood pressure. Vasopressors and intropes are used when volume replenishment is not able to adequately increase blood pressure or with this patient fluid resuscitation is not considered (as he already had 2000mls of luid intra-operatively). (Morrell et al, 2009) Sufficient fluid loading is recommended prior to vasopressor use to try and stabilise the patient with septic shock. (Dellinger et al, 2009) Vasopressor therapy is used to maintain tissue perfusion in the event of critical illness. (Dellinger et al, 2007) Perfusion is reliant on pressure and control of vascular beds are inevitably lost when mean arterial pressure falls below a certain point. (Dellinger et al, 2007) Within the unit the patients are treated with norepinephrine (noradrenaline), which is the drug of choice when treating shock induced hypotension.

This is because norepinephrine is a potent drug and is very effective at treating hypotension compared to other drugs. (Dellinger et al, 2007) Norepinephrine is an ? -adrenergic agonist and has some ? -adrenergic effects. (Urden et al, 2006) Noradrenaline is naturally released by nerve cells, producing the fight or flight response within the body. (Urden et al, 2006) This would normally produce an increased heart rate, increased blood pressure, dilated pupils, dilate air passage in the lungs and narrowing of blood vessels in non-essential organs, which aids the body in coping under stressful situations. Urden et al, 2006) The alpha receptors are found in

muscle tissue, therefore by stimulating these receptors, noradrenaline causes the muscles to contract resulting in narrowing of blood vessels. (Urden et al, 2006) This means that an increase in MAP and systemic vascular resistance with little alteration in heart rate and volume output. (Morrell et al, 2009) Intravenous infusions of noradrenaline at low doses has been reported to increase blood pressure, urinary output and creatinine clearance, resulting in an aid to overall decreasing vasopressor therapy. Morrell et al, 2009) However, as with most drugs, side-effects of high doses of vasopressors, which include headache, bradycardia, hypertension, and inadequate blood flow leading to low levels of oxygen in extremities. (MIMMS, 2011) Studies involving small doses of vasopressin show an improvement in blood pressure over a small period of time. (Russell et al, 2008) The titration of noradrenaline is the nursesresponsibilityonce the doctors order the aim MAP. (Brown and Edwards, 2008) An important part of nursing care is comprehensively assessing the patient receiving vasopressors. Brown and Edwards, 2008) These must include, urinary output, consciousness (if able), colour, temperature, pulses of the extremities, heart rate, blood pressure, signs and symptoms of myocardial schema. (Brown and Edwards, 2008) Titration of the drug is based on current observations. An important aspect to consider when using vasopressors, is to treat the cause of the shock. (Dellinger et al, 2009) This aids in recovery the the decreasing usage of invasive procedures. The use of noradrenaline on the patients improves his oxygenation and outcomes through this acute illness.

The main objective is to improve oxygenation and noradrenaline has an impact on oxygenation by increasing preload, leading to an increased

cardiac output. It also has an impact on cardiac contractility, which increases the force ejection thus allowing the heart to over come any increase in afterload caused by the vasoconstriction. (Urden et al, 2006) The increase consumption of oxygen, oxygen consumption increases. (Brown and Edwards, 2008)This is due to the hypermetabolic rate the critical ill patient is under.

Caring for critically ill patients requires an in-depth knowledge on bodily systems and functions. Within the ICUenvironment, hierarchy of nurses which range from junior to senior. This exists to aid growth within the junior members of staff, as continuingeducationis important. As the above case study shows, numerous problems need to be addressed throughout the care of the patient. As only three issues have been addressed, this only illustrates a small insight into the scope of care the patient received. References Mercat, A. t al, (2008) Positive End-Expiratory Pressure settings in Adults with Acute Lung Injury and Acute Respiratory Distress Syndrome: A Randomised Controlled Trial. JAMA, 6: 646-655 McClare, S. A. , et al (2009) Guidelines for the provision and assessment of nutrition support therapy in the adult critical ill patient: Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition, JPEN, 33: 277-316 Lownfels, A. B. (2008) Recovery after abdominal surgery: Is enteral feeding preferable? A best evidence review. http://www. medscape. org/newarticale/568983 Shils, M.

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