Aspects of the Critical Care Delivery System

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Abstract

Health care today is delivered in numerous forms and systems, each dependent on the patient's needs. One of these systems is the intensive care unit (ICU), also known as critical care. This is a specialized hospital unit where high acuity patients with critical conditions receive treatment. Seeing as these patients are critically ill, their treatment may also have a significant human and economic impact on the patient and their loved ones. This paper will evaluate the intensive care unit as a care delivery system; analyzing the purpose that an ICU serves in health care, while also paying special attention to costs and benefits. The role of the nurse and other healthcare professionals will be described, as these factors largely influence the care given in the intensive care unit. In order to fully evaluate this care delivery system in context, a focused patient case study from The Hospital is included. Lastly, the cost of care for an intensive care unit is analyzed using a sample patient bill. Analyzing the substantial financial and personal impact the ICU has on patients is necessary to continue delivering excellent care.

Keywords: intensive care unit, interprofessional team, critical care, care delivery system

Aspects of the Critical Care Delivery System

Critical care is a care delivery system (CDS) that is designed to provide specialized care to patients suffering from a critical illness or injury. In the United States, 55,000 critically ill patients are cared for each day (Society of Critical Care Medicine [SCCM], 2012). Patients that present to the ICU require skillful care from a number of health care providers. A multidisciplinary team in the ICU is responsible for monitoring these patients and delivering specialized care. ICUs are unique from other units because critical patients are often mechanically ventilated, which requires proficient care. Due to the wide range of critical conditions, many hospitals contain specialized cardiac, neurological, surgical, medical, neonatal, and pediatric ICUs. The hospital houses six ICUs and treats many patients who are critically ill. The surgical ICU (SICU) treats a variety of patients who have been admitted to the ICU post-surgery. Patients in the SICU present with many different critical conditions, including severe trauma. The purpose of this paper is to examine a focused case study on a trauma patient in the Surgical ICU. Analysis of the patient's history, medical records, and medical expenses will deliver increased knowledge about intensive care in relation to design of the care delivery system, patient impact, and cost.

Care Delivery System (CDS) Description

Intensive Care Unit

An intensive care unit is a unit in a hospital where critically ill patients are cared for by a specially trained staff. This staff may include doctors, nurses, therapists, pharmacists, dieticians, social workers, and chaplains. According to the SCCM (2012), more than five million patients are admitted annually to ICUs in the United States. In

2009, it was estimated that the United States had almost 6,000 hospitals with each hospital containing at least one intensive care unit. Additionally, there are about 350 pediatric ICUs and over 1,500 neonatal intensive care units (SCCM, 2012) nationwide. ICUs often rely heavily on the newest technology to keep critically ill patients alive, such as through the use of mechanical ventilation or hemodialysis. The ICU provides patients with respiratory and cardiac support, invasive monitoring, and intense observation by the nurses, doctors, and other members of the staff. The top three diagnoses across intensive care units nationwide are heart failure, sepsis, and ischemic heart disorder, with postoperative monitoring and respiratory failure following closely. The treatment of serious, life-threatening conditions has become more frequent in the ICU, partly due to the aging of the United States population (SCCM, 2012). The SCCM continues to acknowledge that by the year 2020, the population of individuals 65 or older is expected to increase by 50% (2012). It is very common for ICU patients to require continued therapy or treatment after their discharge from the hospital, as many of the patients suffer from chronic conditions. Unfortunately, for the critically ill or injured patient who needs the expert monitoring and technology an ICU provides, there is no other alternative for care.

Current Issues & Concerns

The cost of care for an ICU patient varies based on the severity of the condition and treatments needed for patient care. The average hospital cost for an ICU stay is $34,257, which can be attributed to the skilled care that is typically delivered in the ICU setting and the costliness of mechanical ventilation (Kirton, 2011). One issue that ICU patients experience is the inability to pay for services provided, whether it be because of

lack of insurance or simply high cost of care. If individuals qualify for Medicare, they will have to pay a $1,260 deductible in order for the rest of their care to be paid for (Medicare, 2015). Although cost is a major concern, many hospitals have feasible payment plans that can help lighten the financial burden.

An additional concern with intensive care is the relationship between nursing workload and patient mortality. The high acuity of patients in the ICU can be very stressful on nurses, and as a result may affect the quality of nursing care. An observational, prospective study in a Greek general ICU found that there is a positive correlation between the workload of nurses and patient mortality. The study suggests that understaffing may be a cause of increased patient mortality rates and patient outcomes may improve if staffing is based on individual care needs instead of concrete numbers (Kiekkas et al., 2008). Another factor of concern with ICU care is nurse stress. Visiting hours can be very emotional for families and the emotional stress may put nurses in "mental overload". Working with families of critical ill patients can present a challenge to the nurses because many of the families are going through difficult times and seek support from the hospital staff. Emotional overload and burnout may also occur in ICU nurses due to their excitement-seeking preferences (Burgess, Irvine, & Wallymahmed, 2010). Since burnout and heavy workload have negative effects on patient outcomes, this is a major concern in the CDS of intensive care.

Provision of Care

Registered nurses play an extremely important role in an intensive care unit. These nurses must portray expert assessment skills, become knowledgeable on high-intensity therapies, and demonstrate continuous nursing judgment (American

Association of Critical Care Nurses [AACCN], 2015). ICU nurses have a major responsibility to carefully observe any changes in their patient's status and perform the interventions needed to correct these changes. It is crucial that the nurse has a thorough understanding of common medications, treatments, and therapies used in an intensive care setting. ICU nurses are respected for the large amount of autonomy they have on the unit, and are often challenged to make difficult decisions regarding the best care for their patients. These nurses should act as the patient's advocate at all times, supporting their values, rights, and beliefs. It is also necessary for the nurse to possess therapeutic communication skills because he or she will frequently be in contact with the family members of critically ill patients. Education is always an essential duty of the nurse and discharge planning begins upon admission. In the ICU, the nurse may provide education to the patients families or the patients themselves, depending on the condition of the patient. Lastly, it is crucial for the nurse to be able to work as a team member with the other staff in the ICU, as poor communication among health professionals can lead to poor patient outcomes.

The interprofessional team plays a large role in delivering excellent patient care in the critical care unit. The team members vary slightly according to hospital but usually include critical care nurses, intensivists, nurse practitioners, pharmacists, physician assistants, primary care physicians, respiratory therapists, and dieticians (SCCM, 2012). An intensivist is a physician specially trained in critical care who acts as the director of the interprofessional team. The physician's assistant and nurse practitioner can aid the team by contributing advanced assessment skills and knowledge regarding medications and diagnoses. Having a pharmacist in the ICU allows fast access to

medications and may help to reduce “medication errors, improve patient outcomes, reduce costs and waste, and decrease mortality rates among patients with thromboembolic diseases or infections” (Chant, 2012). Many ICU patients are on ventilators, which requires the expertise of the respiratory therapist to monitor ventilator settings and respiratory progress, in order to get the patient weaned off the ventilator as soon as possible. Lastly, the dietician contributes to the interprofessional team by assessing each patient's personal nutrition needs and formulating customized diet plans.

Each member of this team contributes to the patient receiving the best possible care, and it has been proven that effective interprofessional collaboration results in improved outcomes for critically ill patients (Rose, 2011). However, Rose (2011) goes on to note that the word “collaboration” implies sharing something, which can lead to a power struggle among members of the team. A lack of understanding of roles, poor communication, poor power dynamics, and differences in approaches to patient care are all potential barriers to successful collaboration. For example, focusing on a patient’s needs can often bring a team together but conflict can easily arise when individuals have differing views regarding patient care and treatment. As a member of an interprofessional team, it is the individual's duty to seek out the skills and knowledge that enable them to function effectively within the team in order to improve patient outcomes (Rose, 2011).

Focused Case Study

Patient A was admitted to The Hospital as a 911 trauma following an automobile versus pedestrian collision. Patient was intubated prior to arrival to the hospital and was admitted as a “John Doe” until a family member was able to confirm identity. Once

Patient A was identified, it was revealed that the patient had a past cerebrovascular accident. However, much of the patient's past medical history is unknown due to lack of family support.

The effects of the trauma were severe and displayed a pulmonary contusion, head contusion, and several closed fractures. Due to the patient's extreme condition, Patient A was immediately sedated, ventilated, and admitted to the surgical ICU in critical condition. The course of treatment focused on getting the patient stable through medication, hemodynamic monitoring, ventilator management, and fluid resuscitation under the trauma service. Neurosurgery was consulted for the spinal injuries, as well as orthopedics.

Medications for Patient A were implemented immediately and were altered as needed throughout the hospital stay. Patient A received 20 mg of Famotidine twice a day as a preventative measure against stomach ulcers. Although no history of diabetes was noted, a sliding scale of Humulin R was prescribed. Dopamine in D5W 400 mg plus Dextrose 5% and Norepinephrine 4 mg in a 250 ml diluent were administered intravenously to keep the patient's blood pressure adequately circulating. Proprofol and Midazolam were used as sedative agents and kept Patient A calm while ventilated. Benzocaine, Morphine, and Oxycodone in various doses were prescribed around the clock for pain control. Ondansetron, Diphenhydramine, and Promethazine were used as prevention methods to treat nausea and vomiting. Other medications prescribed included stool softeners, calcium gluconate, magnesium sulfate, potassium chloride, and sodium phosphate. Patient A was maintained on the SIMV ventilator setting with a respiratory rate of 14. Despite the lung trauma, the patient had non-labored respirations.

As noted above, the patient suffered multiple injuries from the collision and required radiology reports to note the full extent of damage. A brain CT scan revealed significant soft tissue damage. However, the skull escaped injury and the brain had no acute structural lesion. A CT scan of the chest with contrast revealed bilateral pleural effusions with associated atelectasis. The patient also had three rib fracture. According to Lotfipour et al. (2009), "rib fractures are the most common chest injury in older adults, and carry significant mortality. Morbidity and mortality increase with the number of rib fractures. For each additional rib fracture, mortality increases by 19%." Supraclavicular and left axillary emphysema was also noted, which may have occurred post-trauma. Fracture was noted on both the tibia and fibula. The spinal CT indicated that the spinal cord was likely compromised.

Nursing priorities and care for Patient A included medication administration, pain management, and hemodynamic monitoring. Keeping the patient's vitals and labs stable was also a top priority and required frequent assessment and interventions. On the third day since admission, Patient A's blood sugar dropped to 37, requiring an amp of D50 to bring the patient back to a stable glucose level. Unfortunately, in a final report the next day, the doctor noted that the patient was severely unstable and the chances for recovery were slim to none.

Evaluation of CDS

As mentioned above, Patient A was a patient who presented as a trauma with barely any medical history available. It is very possible that the past stroke had negatively impacted the patient's health prior to his accident. It should also be noted that the risk of death after trauma is significantly increased in patients older than 65 years of

age (Lotfipour et al., 2009). This lack of knowledge about past medical conditions combined with the patient's advanced age presented a challenge to the entire healthcare team. The best possible outcome would be for Patient A to return to pre-accident health status, however due to the patient's injuries, this outcome was unlikely. During the patient's stay at the hospital, a multidisciplinary team was required to give Patient A the care needed in critical condition. An RN performed daily duties such as medication administration, oral care, and wound care. The RN was also responsible for noting changes in Patient A's status and reporting any changes to the physician. A neurosurgeon and an orthopedic surgeon played a crucial role in the interprofessional team by evaluating and developing a plan of treatment for the patient's cervical and leg fractures. Respiratory therapists provided care by monitoring the ventilator settings, respiratory progress, and arterial blood gases. Hunningher, Shirley, Lalabeyhan, and Wilson (2015) found that effective teamwork in critical care has been shown to extend beyond the heat of crises to the equally important realm of routine care. All of Patient A's caregivers worked very hard to monitor closely and were quick to take action when a change in status occurred.

Patient A's severe condition required expert care from all members of the interprofessional team, and it is apparent from progress notes that the patient received quality care at the hospital. However, the patient's advanced age, past cerebrovascular accident, and unknown medical history probably contributed to the poor prognosis. If the patient was able to be discharged from the hospital, the patient would most likely need extensive therapy to regain strength from the injuries and become independent in activities of daily living. Family support would also be an extremely beneficial factor in

this case, which the patient did not have. Although the interprofessional team worked hard to deliver excellent care, the severe effects of Patient A's accident resulted in a challenging case for all team members involved.

Cost of Care

Cost of Intensive Care

The cost of care in an intensive care unit varies widely among hospitals throughout the country. The cost per admission ranges from $1,748 to $78,435 (Seidel, Whiting, & Edbrooke, 2006). This can be attributed to differences in treatment, advances in technology (which may increase or decrease costs), disparities between facility sizes, and most importantly, the differences in ICU cost methods. According to Seidel et al. (2006), there is no remarkable relationship between the cost of care and therapeutic activity and outcomes. However, length of stay may influence outcomes. The average length of stay in the ICU is 14.1-16.9 days (Kirton, 2011). It is proposed that each day in the ICU adds 1.5 days to hospital stay once a patient has gone to a step-down unit. Considering the costs of care in the ICU, it is essential to focus on decreasing the LOS as much as possible. This may not be feasible, especially for severe trauma patients like Patient A who have little to no chance of improvement. While there are many causes for admission to the ICU, the average causes of death in the ICU are multi-organ failure, cardiovascular failure, and sepsis. Mortality rates vary from 10% to 29%, which is significantly higher than other units (SCCM, 2012).

To cover the cost of care, patients may use Medicare, Medicaid, or private insurance. Low-income families and individuals may have Medicare or Medicaid insurance, which includes several different plans. Medicare is government provided and

one of the most common forms of insurance for acute care. Although this is a viable solution for low-income recipients, there are certain criteria that must be met in order to qualify. If an applicant qualifies, they may choose from a variety of plans to fit their specific needs. Medicare Part A covers inpatient care, such as ICU hospitalization, and most patients with this plan do not have to pay a monthly premium. However, Part A will not cover a private room, private-duty nursing, or personal care items. A patient with Part A has a $1,260 deductible for each benefit period (which renews when the patient has not visited an inpatient hospital in 60 days) and is not required to pay co-insurance for the first 60 days. During days 61-90, the patient must pay $315 coinsurance per day, and Medicare will pay any balance. Beyond 90 days, the patient will pay $630 a day until their lifetime reserve days are gone. After this time, the patient is responsible for all payments (Medicare, 2015). If a patient does not qualify for Medicare, they may receive assistance from Medicaid. Since the insurance company decides what will be covered, patients may find themselves covering the full costs for certain services. Likewise, hospitals may end up paying for services that insurance will not reimburse.

The Affordable Care Act has implemented a hospital reimbursement system on the basis of quality called hospital value-based purchasing (VBP). This system focuses on the patient's experience of care via survey, clinical process of care, outcomes, and efficiency. These aspects are scored and then combined to come up with a Total Performance Score (TPS). The TPS of Patient A's hospital is 28.83 out of a possible 100. This can have a negative impact on the amount of money Medicare is willing to

reimburse the hospital. Unfortunately, when the cost of care exceeds reimbursement, the hospital is responsible for the leftover expenses (Medicare, 2015).

Cost of Care for Patient

The provided sample bill documents the cost of care for a patient who stayed in a medical surgical ICU for 16 days. The total cost of care for this stay in the ICU was $117,410.46. It cost $1,325 daily for the room alone, which added together only makes up for 18% of the patient's total bill. Because of this patient's deteriorating condition, several expensive treatments and services were required. When the patient arrived to the ER, a blood transfusion, IV meds, and a code blue were ordered. The expenses for these ER treatments totaled at $3,489.25. Another expensive treatment was respiratory therapy, which cost a total of $22,891.75. The patient was charged $1,013.75 daily for the ventilator and also received costly respiratory care such as oxygen therapy, high-flow nebulizer treatments, and daily aerosol. Invasive and diagnostic procedures including an endoscopy, CT scan, EEG, Echocardiogram, MRI, and X-rays added up to $14,903.05. Many of the other miscellaneous expenses came from medications, blood products, and laboratory fees, which also counted for a large portion of the bill.

The patient who received this bill did not have insurance and therefore will have to cover the expenses through private pay. In this case, the patient could have greatly benefitted from having some form of insurance. If the patient had Medicare Plan A (which covers acute care), a $1,260 deductible would be required before Medicare paid for the rest of the bill (Medicare, 2015). Any form of insurance could have decreased the out-of-pocket costs for this patient. Considering the high price of this medical bill, it would be ideal for this patient to have had Medicare to assist in paying off this

expense. Although this is a sample bill, it is likely that Patient A would have similar charges and costs since Patient A was also an ICU patient.

As a result of Patient A's critical condition, many life-saving and expensive treatments were needed. That being said, it is unlikely that the cost of care could have been reduced by avoiding certain services. However, health care providers can play an important role in reducing the cost of care by preventing infection, frequently monitoring for extubation, and providing high quality care. By doing so, HCPs may be able to decrease the length of stay and improve outcomes, therefore lowering the cost of care for patients such as Patient A.

Conclusion

While the aspects of patient satisfaction and quality of care are very important, the cost of care is a major factor in the healthcare system for both the CDS and the consumer. The increasing demand for intensive care in the U.S. may lead to many problems down the road such as nursing shortages, hospital overload, and increased cost of healthcare, which in turn may have negative effects of the quality of care and patient outcomes. The increased cost of intensive care could potentially lead to serious financial problems for low-income patients and patients without insurance, and the cost of care will likely fall into the hands of the hospital. This problem, if not addressed, may cause long-term financial issues in the critical care system. Intensive care facilities must find solutions to lower costs and increase quality of care for this CDS in order to continue improving patient outcomes.

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Effects of Critical Care

CDS Description

- Intensive or critical Care is a CDS that provides highly skilled and specialized care to patients with critical illnesses or injuries.

- Intensive care is delivered in the hospital and involves a multidisciplinary team of physicians, nurses, respiratory therapists, pharmacists, and dieticians.
- Intensive Care Units (ICUs) are often specialized in order to deliver the best care possible. Specializations include cardiac, neurological, surgical, medical, pediatric and neonatal. This care is typically provided by healthcare professionals who have specialized in that specific field.
- ICUs are different from other hospital units because patients are often mechanically ventilated, which requires skillful care and frequent assessments.

Costs and Reimbursement:

- The cost of care in the ICU varies due to differences in patient condition and services provided. Because many expensive treatments are usually needed in order to treat critical conditions, the bill for a patient in the ICU is typically expensive.
- The average cost of an intensive care unit in the U.S. is $34,257 (Kirton, 2011).
- Medicare is one of the most common forms of insurance for acute care. Medicare Part A covers inpatient care, such as ICU hospitalization, and most patients with this plan do not have to pay a monthly premium (Medicare, 2015).
- Insurance companies decide which services they will reimburse, and because of this, patients and hospitals may be required to pay for services not covered.
- Medicare determines the amount that will be reimbursed by using a tool called the Total Performance Score (TPS) which takes into account patient satisfaction, patient's experience of care via survey, clinical processes of care, outcomes, and efficiency.

- Although a bill could not be attained for Patient A, a sample bill from a similar patient was used for comparison. The sample bill cost a total of $117,410.46. The most expensive services that contributed to the bill were ER treatments, respiratory therapy, and various invasive and diagnostic procedures. It is likely that Patient Ahad similar expenses to cover.

Conclusion:

- The increasing demand for intensive care in the United States may lead to many problems down the road such as nursing shortages, hospital overload, and increased cost of healthcare, which may in turn have negative effects on the quality of care and patient outcomes.
- Insurance pays for the majority of healthcare provided in the ICU, but when care is not reimbursed the hospital is forced to pay the expenses.
- It is crucial for healthcare providers to determine ways to provide high quality of care while also reducing the costs of care.