Improving patient safety in intensive care units

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SUMMARY

- Adverse events and errors are a major problem in healthcare systems all over the world. Due to their condition, critically ill patients are arguably more vulnerable to adverse events than other patients. Infections, medication errors, and equipment failure are the main types of adverse event.
- Patients, critical care nurses and the healthcare system are all victims when an adverse event occurs.
- Adverse events and errors require international attention, and legislation at a national level is required. With reference to patient safety, data collection and reporting systems, and a blame-free environment are important tools in the fight to reduce adverse events and errors.
- Nurse staffing levels, staff support, education, simulation training and care bundles are key elements that should all be taken into consideration with a view to improving patient safety.

INTRODUCTION

Errare humanum est. Adverse events are inevitable - not learning from them is unforgivable (Beth Lilja).

Patient safety is a serious, global public issue. Estimates show that in developed countries as many as one in ten patients are harmed while receiving hospital care. Furthermore, the probability of patients being harmed in hospitals is higher than in industrialised nations. The risk of health care-associated infection in some developing countries is as much as 20 times higher than in developed countries.

In recent years, countries all over the world have recognised the importance of improving patient safety. In 2002, World Health Organization (WHO) Member States agreed on a World Health Assembly resolution on patient safety and in 2004 launched the World Alliance for Patient Safety (WHO, 2004).

Critical or intensive care is a complex specialty developed to serve the individual and delicate healthcare needs of patients and families with actual and potential life-threatening conditions (European federation of Critical Care Nursing associations, 2004). A nurse who is qualified in critical care will have completed a specialist post-qualification education in critical care nursing. In meeting the complex needs of critically ill patients, such nurses require a well-developed knowledge base, along with specialist skills in both the technological and the caring dimensions of critical care nursing. They must be equipped with the expertise to make sound and rapid clinical judgements within the critical care environment (WHO, 2003). Critical care units are areas where the staff has to deal with the unexpected. In summary, being a nurse in an intensive care unit (ICU) requires extensive clinical knowledge, advanced skill in making difficult decisions, and decisive actions whilst maintaining close working relationships with team members and other hospital staff. ICU nurses must also demonstrate their knowledge and skills using complex technical equipment.

Due to their critical condition, ICU patients are arguably far more vulnerable to adverse events than most other patients. Critically ill patients have a limited ability to defend themselves from the consequences of health care errors. One of the reasons for this is their reduced ability to communicate symptoms to healthcare providers. The risk of adverse events caused by medications or equipment malfunction is higher because patients in the ICU receive twice as many medications as patients in general units and often require mechanical support of normal body functions. Consequently, the patient in the ICU has a higher exposure to medical errors than patients in other areas of the hospital (Vande Voorde & France, 2002).

Adverse events are preventable. Most events result in some degree of harm or potential harm to the patient however, sometimes an adverse event can be fatal; and this is the case for all patients; not only patients in the ICU. However, hospital staff must pay close attention to patients in ICUs due to their critical condition.

Defining an adverse event

An adverse event means an event happening to the patient at the hospital, resulting from their treatment or stay - not resulting from their illness. An adverse event can be either harmful or could have been harmful had it not been avoided beforehand - or if the event for some reason did not occur. Adverse events comprise events and errors both known and unknown (Danish Society for Patient Safety, 2008).

Common adverse events

Many studies have investigated the most common causes and most frequent types of adverse event that occur in healthcare systems in general and in ICU in particular. A one-year observational study from USA, using a sample of 391 patients in two ICUs revealed 120 adverse events and 223 serious errors. 13% of the adverse events were life-threatening or fatal, and among the serious errors 11% were potentially life-threatening (Rothschild et al., 2005). Another study revealed that the most common adverse events in ICUs are caused by staff and are related to medication, technical equipment, and nosocomial infections (Brown, 2001). In the USA

alone, 98000 patients die from medication errors (Brown, 2001). Eggimann and Pittet (2001) showed that approximately 33% of ICU patients acquired a nosocomial infection; mostly sepsis and ventilator associated pneumonia. Furthermore, a multinational study including 205 ICUs representing 29 countries concluded that so called 'sentinel events' (unintended events that compromise patient safety) related to medication, indwelling lines, airway and equipment failure in ICUs occur with considerable frequency (Valentin et al., 2006).

Consequences

Wears and Wu (2002) suggest that there are two victims when an adverse event leads to injury: the patient and the healthcare professional. If a patient is subjected to an adverse event, the consequences can be wide-ranging, from no consequences at all to increased morbidity and fatality. Adverse events can increase ICU and hospital length of stay (LOS), and can, in the longer term, cause post traumatic stress disorder (PTSD) and leave a person unfit to return to work.

The ICU is often described as a highly stressful environment, and dealing with the unexpected is one of its greatest challenges. It is suggested that nurses working in ICUs are at high risk of committing adverse events due to their heavy workload, lack of education, unexpected situations and sense of responsibility. When an adverse event occurs, regardless of whether a nurse is blamed or not, feelings such as punishment, guilt, uncertainty, depression, and lack of collegial support result from it (Wears & Wu, 2002) and sometimes healthcare professionals resign under these circumstances (Poncet et al., 2006)

Although Wears and Wu (2002) only describe two victims of adverse events, there is also a third: the healthcare system itself. It is obvious that adverse events resulting in increased LOS and increased complication rates have an influence on costs. ICU is a high-cost consumer, and decreasing the costs associated with adverse events could release funds for other purposes, for example more ICU beds, more staff and better education of nurses (Bates et al., 1997).

Efforts to improve patient safety in ICU

Avoiding adverse events and errors is undoubtedly an International matter. The WHO, when launching the World Alliance for Patient Safety urged Member States to pay close attention to the problem of patient safety (WHO, n.d.). The Alliance raises awareness and political commitment to improve the development of patient safety policy and practice in all WHO Member States.

In the USA, the Save 100K Lives was a campaign initiative to cut avoidable deaths, which was started by the Institute for Health Care Improvement (McCannon et al., 2006) and is based on six key interventions (Berwick et al., 2006):

- deploy rapid response teams to patients at risk of cardiac or respiratory arrest;
- deliver reliable, evidence based care for acute myocardial infarction;
- prevent adverse drug events through drug reconciliation (reliable documentation of changes in drug orders);
- prevent central line infections;
- prevent surgical site infections; and
- prevent ventilator associated pneumonia.

These interventions clearly have a patient safety focus. The goal-directed campaign is estimated to have actually saved 123000 lives, and several European countries have adopted this model and are now making an effort to increase patient safety by reducing adverse events and errors. In 2007, Denmark launched its Operation Life programme using the 100k Lives interventions. It is targeting all Danish hospitals and the goal is to save 3000 lives within eighteen months (Operation Life, 2008).

In the USA, the Save 100k Lives campaign was followed by the current 5 Million Lives campaign (2006-2008), which is based on a voluntary initiative to protect patients from five million incidents of medical harm (Institute for Healthcare Improvement, 2008).

National level

If patient safety is to provide a purposeful contribution to reduce adverse events and errors in the health care system, then authorities require data. Data is the currency of healthcare services; without it, it is not possible do business effectively.

Four years ago the Danish Ministry for the Interior and Health (2003) launched a new law called Act on Patient Safety in the Danish Healthcare System (ACT No. 429 of 10/06/2003). The objective of the Law is to improve patient safety within the Danish health care system. The law is unique in more than one way. It is the first of its kind in the world and it operates within a so called blame-free environment. From their year-long ethnographic study of patient safety in an ICU Hazlehurst and McMullen (2006) concluded that understanding cultural processes helps to improve implementation of safety enhancing interventions and technologies.

The new Law gives healthcare professionals the opportunity to report any adverse event anonymously and states that a healthcare professional reporting an adverse event shall not be subjected to disciplinary investigations or measures by the employing authority, supervisory reactions by the National Board of Health or criminal sanctions by the courts. The National Board of Health receives reports on adverse events from the county councils and has established a national register for such events. On the basis of the information received, the National board of Health shall advise the healthcare system on patient safety. If an adverse event causes the death of a patient, the event is investigated using the root cause analysis method. The main objective of the Law is to learn from adverse events in order to improve the care for the patient. Therefore it is referred to as a learning system.

Two years after the Law was put into force the number of reports increased considerably. This does not mean that the number of adverse events is increasing; it indicates that healthcare professionals have become more open-minded and secure about reporting any adverse event. This has resulted in a growing database and a lot of information to learn from. However, the true extent of adverse events and errors that take place in the hospitals and ICUs is still unknown. Many adverse events are never discovered and many will never be reported (Danish Society for Patient Safety, 2008).

Hospital level

Patient safety policy must be deeply rooted in the hospital management. In Denmark, although the adverse events are reported anonymously, the reports are returned to each hospital as a part of the learning system. Under the leadership of the hospital directors, each unit receives their own report.

The Patient Safety Ward Round (or Patient Safety Leadership Walk Round) is an approach just released in European countries. The round is a method to identify patient safety problems and to improve and support a patient safety culture. At least once a year the managers meet with each unit at the hospital to discuss patient safety; it is crucial to all employees (Frankel et al., 2005).

Ward level

In Denmark, every unit has a patient safety manager whose role is to encourage the staff to report all kinds of adverse events or near

misses. After the return of the reports the patient safety manager looks through the reports and takes action on each an every one. In this learning environment, if an adverse event has occurred several times, critical review of daily practice is required in order to avoid similar adverse events in the future.

Taking care of a staff

Healthcare professionals involved in adverse events and errors initially need emotional support and empathy. Although colleagues may be non-critical, when they discover that a colleague has reported an error or an adverse event, not many hospitals have a policy on supporting and debriefing a physician or a nurse who has inadvertently committed an adverse event. Implementing a blame-free environment takes time, and the most important effort is to encourage and support each other when an adverse event has happened. Hospitals and their departments should have written policies on how to support and care for healthcare professionals in order to avoid PTSD (Goldberg et al., 2002).

ICU nurse staff levels and education

ICU nurses have to respond in a timely manner to changes in the patient's condition and their ability to make accurate clinical judgements is crucial. Inexperienced nurses are often unprepared for the demands of critical care nursing and require extra support and supervision. An Australian study suggests that nursing staff inexperience can have a negative impact on the quality of care delivered to critically ill patients (Morrison et al., 2001). Moreover, errors made by inexperienced staff are more likely to occur in combination with staff shortages, inadequate supervision and high unit activity. Morrison et al. recommend that when employing staff, nurse educators and nurse managers must consider the special requirements of inexperienced nurses. This recommendation is in line with the findings from a multi-centre study from the USA which concluded that a higher proportion of hours of nursing care provided by registered nurses is associated with lower rates of complications such as pneumonia, cardiac arrest or shock, and failure to rescue (Needleman et al., 2002). The need for highly educated nurses in critical care areas should be obvious, however a European survey of critical care nurse education revealed that many nurses lack higher education qualifications and there is great variation in nurses' education level between countries (Baktoft et al., 2002).

Simulation

Critical thinking is essential in critical care practice. Despite the best efforts to prepare nurses to provide safe and effective care, often there is a significant gap between the theory taught in the classroom and the realities of clinical practice. Henneman and Cunningham (2005) described how the increasing focus on patient safety encouraged them to implement clinical simulation in an acute/critical care course. Simulation as a teaching strategy appears to hold great promise for teaching critical thinking. Sophisticated simulators allow real patient situations to be replicated in a safe environment for practice and learning. While other industries have effectively used simulation as an educational strategy to improve safety and performance for ages, for example aviation, the use of simulation is still not fully implemented in nurse education (Rauen, 2001; Long 2005).

In recent years, the focus on patient safety has helped to increase the use of simulation training in many countries, as a part of their critical care courses. In Denmark, during the last decade, simulation training has been mandatory for anaesthesia nurse education. As for critical care nursing education, the training of acute competencies via a simulator is approaching a mandatory level as well.

The most pressing reason for integrating simulation into critical care education programmes is to educate nurses to learn acute care competencies in a virtual space that does not jeopardise the patient's safety.

According to Rall and Dieckmann (2005) not every simulation needs a simulator and not every form of training using a simulator is simulation. They define simulation as: the means to do something in the "as if" to resemble "reality" [for example] to train or learn something without the risks or costs of doing it in reality.

Simulators are tools that are used to resemble aspects of reality. Many simulators are used for skills training, such as basic life support, which even though a simulator is used, cannot be classified as simulation (Rall & Dieckmann, 2005).

Not all countries and critical care nursing schools are able to afford the cost of a computerised simulator. More important than the provision of a highly technical mannequin, is that simulation training is performed. This can be achieved using colleagues and/or basic mannequins instead of patients. Clinical scenarios based on actual cases (for example, those derived from root cause analyses) can be used to educate nurses to prepare for unforeseen events. Structured debriefing of simulations allows inexperienced critical care nurses and students to reflect upon their actions.

ICU nurse staffing and the occurrence of adverse events, complications and costs

Nurse staffing levels vary considerably between ICUs and the optimal nurse: patient ratio depends upon a variety of factors, for example the acuity level of the ICU. Normally, the higher the acuity level, the greater the nurse; patient ratio should be. However, in many countries, efforts to reduce the cost of hospital care have resulted in decreased nurse: patient ratios, not only in ICUs but also in general wards. Several papers have been published concerning the matter of increased complications and the appearance of adverse events in ICUs and the conclusions are clear. Inadequate nurse staffing leads to increased resource use, particularly in the form of longer length of stay (Provonost & Jenckes, 1999). Reduced nurse staffing is significantly associated with an increased risk of complications in patients undergoing abdominal surgery (Dang et al., 2002) and reducing the nursing workforce at night is associated with increased risk for specific postoperative pulmonary complications (Dimick et al., 2001).

Evidence-based practice

Evidence-based medicine is "the conscientious, explicit and judicious use of current best evidence in making decisions about the care of patients" (Sackett et al., 1996 p. 71). Evidence-based medicine has been practised for over a decade, resulting in many examples of improved treatment and reduction of complications. Similarly, evidence-based nursing can achieve the same effects by improving nursing care, preventing complications and thereby reducing adverse event and errors. In using evidence-based practice as a process for improvement, healthcare professionals must draw upon both individual and clinical expertise as well as the best available external evidence. Without clinical expertise external evidence may be inappropriately applied, and without external evidence clinical practice may be outdated, exposing patients to adverse events and errors. It should be noted however, that unexpected events are common in ICU and although evidence-based guidelines can be used to manage the majority of patients, frequently it is necessary to deviate from the 'norm' in order to deliver individualised patient care and interventions.

Care bundles

Care bundles are sets of evidence-based best practices designed to optimise treatment and prevent complications. The process of developing a new care bundle is straightforward. First, the critical

care theme must be identified, then the literature must be searched and categorised according to its evidence and finally, on basis of relevant research evidence, the interventions are made (Fulbrook & Mooney, 2003).

The most well known care bundle is the ventilator bundle, which is based on four components: deep vein thrombosis (DVT) prophylaxis, gastric ulceration prophylaxis, head of bed elevation, and sedation vacation. Care bundles which are implemented in critical care areas can enhance the quality of care and reduce the tendency for individual practices to occur that can result in adverse events and errors.

CONCLUSION

Adverse events pose a serious problem to all ICUs worldwide and the consequences for patients and staff are obvious. It is important to firstly recognise that adverse events do happen every day and patients in critical care areas are often more at risk than other patients. Secondly, legislation such as the Danish Law based upon a blame-free culture, signals the way forward. When healthcare professionals feel empowered to report adverse events and errors, without the risk of punishment, then more events get reported and as a consequence the hospital learns more about its healthcare system, which it can improve.

It is evident that staffing levels and education impact on the quality of patient care and the frequency of adverse events and errors. Simulation-based education can offer a valuable contribution by providing a safe environment in which to learn skills that can help to reduce adverse events, and as a medium in which to act out scenarios based on adverse events in order to learn from them. Care bundles provide an effective evidence-based approach, which can result in improved care, reduction of errors and adverse events, and as demonstrated by the Save 100k Lives campaign, can save lives. Patient safety is an obligation we cannot ignore.

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