

## CHAPTER FOUR

# Safety and Quality in the ICU

Maria Isabelita C Rogado, Adriano Friganovic, Vedran Dumbovic

### LEARNING OUTCOMES

After completing this chapter you will be able to:

- Discuss the importance of patient safety as a discipline
- Identify learning on patient safety
- Be motivated by the sharing of a Philippine quality story
- Implement safety control principles
- Define Total Quality Management
- Describe the Deming's cycle.

### CHAPTER OVERVIEW

#### Safety in ICU

The critical care unit remains to be one of the challenging areas in the hospital that is besieged with high intensity care and activity. It is the place where the sickest patients are kept for vigorous round the clock monitoring and management, and as such iatrogenic complications in the critical care units are inevitable, often leading to medical emergencies. Iatrogenic complication results from the activity of a health care provider, or an adverse condition in a patient resulting from treatment by a physician, nurse or allied health professional. To help direct efforts to improve patient safety, a variety of paradigms has been proposed, each offering a new—or at least a different—way to tackle the problem. These paradigms fall into three broad categories: focus on reducing healthcare professional (HCP) errors; focus on reducing patient injuries; and focus on improving the use of evidence-based medicine (Karsh et al, 2006).

In 1981 the red flag was raised for the medical community to articulate the serious risk associated with hospitalization. Until now the health care industry strives to identify measures that will improve and make progress to keep the patient safe. Aptly to say the World Health Organization provided the simplest definition of patient safety by stating that this is the prevention of errors and adverse effects to patients associated with health care.

Vigilance in care remains to be top priority skills amongst the health care practitioner in this area to keep patient safe. However, studies have shown that a great number of patients still suffer from adverse events and error while critical care is instituted. As a response to this grim scenario, patient safety is a new discipline that emphasizes the reporting, analysis and prevention of medical error that often leads to adverse healthcare events.

An important aspect to this realization of preventing patient harm has been the growth of interest in patient safety. Critical assumptions in health care were rewritten by patient safety thinking. How to understand why people make errors that lead to adverse events shifted from a single cause, legalistic framework to a system engineering design framework, and in so doing, it changed forever the way people think about health care delivery (Emanuel, et al 2008). According to the Patient Safety Alliance, the frequency and magnitude of avoidable adverse patient events was not well known until in 1990s, when multiple countries reported staggering numbers of patients harmed and killed by medical errors. Recognizing that healthcare errors impact 1 in every 10 patients around the world, the World Health Organization calls patient safety an endemic concern (WHO, 2008)

#### Learning on patient safety

The field of patient safety is maturing rapidly. More training on safety awareness are provided for the healthcare practitioners; clinicians and

researchers are designing interventions, health systems are implementing safety initiatives and programs, regulators are evaluating practices and governments are launching national health care safety agencies. Globally, even in the developing areas of the world, WHO itself is implementing safety projects with its international partners.

In the last decade, the global community learned about the nature of safety in health care. The article published in the WHO Patient Safety website written by Pronovost stated the following learning: there are no quick fixes to this problem of patient safety; measures must be meaningful and valid to the clinicians who ultimately must use them to improve safety; science is necessary to ensure that patients are really safe; and no one discipline, or single theory alone will be sufficient (Pronovost, n.d.)

Critical care nurses and administrators strive to prevent errors from happening and have instituted various initiatives and interventions to promote patient safety. It is with the understanding that the key to the attainment of safety is the development of a culture of safety amongst the healthcare providers caring for the critically ill. Likewise, efforts should be exerted to identify the common factors contributing to error or adverse event so that a viable and appropriate solution can be developed.

#### Philippine scenario on patient safety

The Philippines, as a developing country, is striving to attain safety culture in health care. As a country, it is besieged with challenges in health care that impact on safety. The factors relevant to these challenges are the following: issues on human resource for health such as nursing supply and demand; changes in the disease pattern and implementation of health care safety systems.

The human resources for health in the Philippines are enormous but unevenly distributed. There is a maldistribution of health professionals, stemming from the lack of budget for the human resource for health positions or plantilla items. The nurse-to-population ratio is about 0.31 per 1000 people in 1993, but since then, this number grew dramatically to 4.43 per 1000 in 2000 and stabilized until 2005 (WHO-WPRO, 2013). This large increase was mainly due to the high demand for nurses in other countries, thus making the Philippines the major source of health professional to other countries.

The social forces of globalization and urbanization that shape today's civilization, has influenced the changes in the Philippines' disease patterns. Fifty percent (50%) of disease pattern are related to non-communicable disease. The burden of these specific diseases is heavily concentrated on the young and working adults or the poor (Ravichandran, n.d.). Likewise, cyclones and typhoons in the Philippines are causing frequent mudslide flooding leading to other communicable disease.

These events brought about by the maldistribution of human resource for health, demographic trend of disease burden, financial pressures and the demand for health care and nursing service leads to combination of circumstances that aggravates the health care situation and patient safety in the Philippines.

#### A quality story on patient safety

Confronted by the identified challenges, the health practitioners in the Philippines manage to make great efforts in attaining patient safety. Guided by the Institute of Medicine's principles of "safe, effective, patient-centered, timely, efficient and equitable (IOM, 2001)" care, initiatives and programs are innovatively designed and implemented to ensure that the patients they cared for are safe.

Critical care nurses in the Philippines share their innovative patient safety practices during the yearly congress of the Critical Care Nurses Association of the Philippines, Inc. (CCNAPI). Their innovative practices emphasize that safety and quality are concepts on a continuum. A quality story that was shared during the 2014 CCNAPI Congress demonstrated safety and quality continuum while the nurses implement the safety practice on pressure ulcer prevention. For the purpose of sharing, this story from neurocritical care nurses in a tertiary hospital will be discussed in this article. It emphasized that safety simply will go beyond turning.

## Beyond turning (Coronado, 2014)

This quality story was presented by nurses from the Neurocritical Care Unit and Epilepsy Monitoring Unit (NCU-EMU). The team was composed of 18 critical care nurses, a nurse manager and a neuro-intensivist and they were so concerned about the occurrence of pressure ulcers in their unit. With the commitment and desire to put patient's safety first, they strived to succeed, prevail and overcome the pressure ulcer concern threatening the safety of the patient....and so they started to know their facts.

The data as shown in Figure 1 revealed a diminishing trend in the occurrence of pressure ulcer until an absolute "zero" was attained. This summarizes the achievement that they had after instituting the quality measures on the project against pressure ulcers.

How was this possible? The NCU-EMU team adopted the Six Sigma techniques as the tool for process improvement. Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes. Originally developed in 1996 by Motorola, the business management strategy is now used in many different industries in an effort to improve the quality of products or services produced by the business through the removal of defects and error (BusinessDictionary.com).

The safety project entitled "Beyond Turning: Reducing the rate of hospital-acquired pressure ulcer" addresses the challenges and opportunities of pressure ulcer prevention to the nursing workforce. The project required five phases of the Six Sigma: Design – Measure – Analyze – Improve – Control.

The first phase – Define - is summarized in Figure 2 by showing the project description in terms of the problem/issue, purpose/objective, importance, expected deliverables and project scope.

The second phase – Measure - was demonstrated in Figure 3 which showed the data measured from January 2012 to July 2013. The team studied the trend and focused on the numbers. They closely examined the factors that can be attributed to the occurrence of the pressure ulcers.

The third phase – Analyze - was demonstrated in Figure 4. Ishikawa Fishbone diagram also called Cause-and-Effect diagram identifies many possible cause for an effect or a problem (ASQ, 2005). The NCU-EMU team used this diagram structure to brainstorm on the pressure ulcer concern because it immediately sorts the ideas into useful categories. Figure 5 on the other hand shows the frequency distribution of the factors related to the presence of hospital acquired pressure ulcers. Surprisingly, the brainstorming of the NCU-EMU team presented that the factor with highest frequency pertains to the lack of proper knowledge on pressure ulcers common among the nurses. The nurses realized that the skin care issues previously reported as pressure ulcer were not really pressure ulcers in the strictest sense and that not all pressure ulcers are preventable.

The fourth phase – Improve - made the NCU-EMU team formulate the goal to be achieved by the project. The goal was "reduction of hospital-acquired pressure ulcer by fifty percent (50%) in six months". An orientation on the process improvement "Beyond Turning" was made. Figure 6: Spread the Message demonstrated the great enthusiasm of the NCU-EMU nurses during the orientation.

The orientation focused on educating the nurses on the definition of pressure ulcers and the stages of pressure ulcers following the guidelines of the National Pressure Ulcer Advisory Panel. The action did not stop with

## Pressure ulcer: Facts and Figures

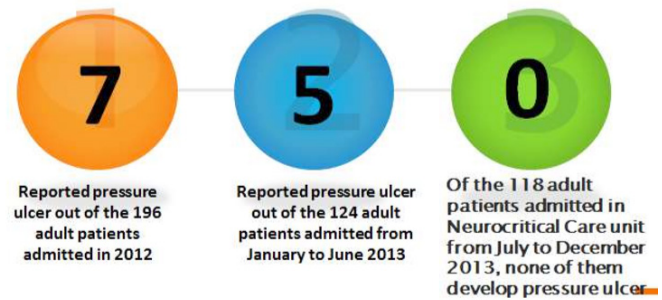


Figure 1. NCU-EMU data on pressure ulcers

Project Description	
Problem or Issue	Pressure ulcers are difficult to treat and costly but most of them are preventable if good clinical practice is strictly followed. Prevention, early detection and appropriate management are essential elements needed to eliminate, if not minimize the incidence of pressure ulcers. However, despite the availability of resources on PU prevention a considerable number of cases of pressure ulcer particularly hospital-acquired are still being reported.
Purpose or Objective	<ul style="list-style-type: none"> <li>*Examine current state of hospital-acquired pressure ulcer in the hospital especially among Neuro-ICU patients</li> <li>*Determine contributing risk factors of pressure ulcer development in critical care unit.</li> <li>*Develop action plan that will address pressure ulcer development.</li> <li>*Develop reference guide in preventing and managing pressure ulcer.</li> <li>*Reduce the rate of Hospital-acquire Pressure Ulcer by 50%.</li> </ul>
Importance	This study will address the challenges and opportunities of pressure ulcer prevention to the nursing workforce. Moreover, this study aims to eradicate, if not reduce the number of reported hospital-acquired pressure ulcer thereby delivering better quality nursing care.
Expected Deliverables	This study is expected to create improvement in the prevention, detection and management of pressure ulcer. Likewise, reference guide and Bundle of Care for pressure ulcer are expected written output.
Project Scope	Patients who are 19 years old and up and admitted at the Neurocritical care unit within 24 hours are the scope of this project. Patients with pressure ulcer at the time of admission, either hospital-acquired or home-acquired, are not included in this study.

Figure 2. Beyond Turning project description

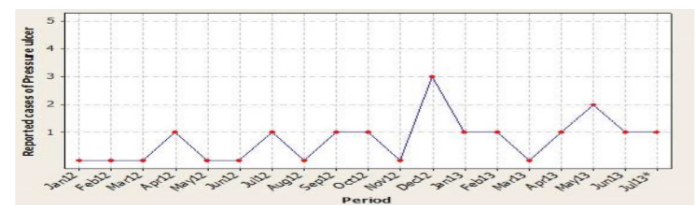


Figure 3. Number of reported HAPU in NCU-EMU

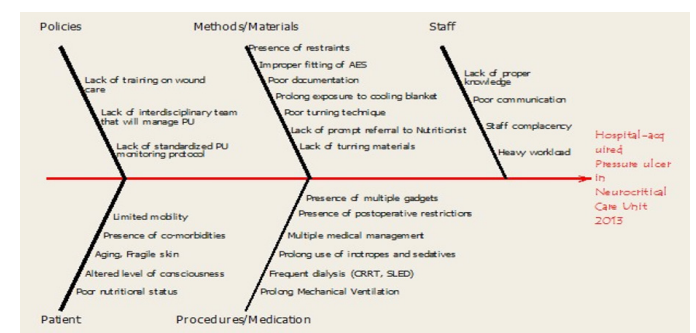


Figure 4. Ishikawa Fishbone diagram for HAPU in NCU-EMU

the orientation. The NCU-EMU team made their campaign visible and the nurses continued gaining knowledge through on-line courses, likewise, the team did not forget the patient's family. They involved the family in the plan of care for the patient and educated them on things they have to know about skin care and pressure ulcers, making the family partners in care.

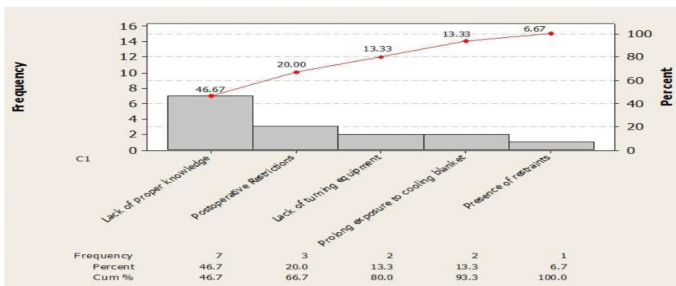


Figure 5. Frequency distribution of factors related to HAPU



Figure 6. Spread the Message

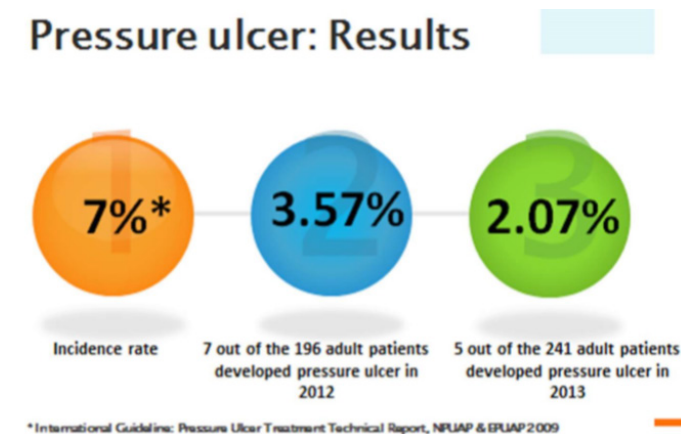


Figure 7. Pressure ulcer results

The final phase of Six Sigma technique – Control - was established by the team by putting a benchmark. Figure 7 shows the comparison of the data from the NCU-EMU with the benchmark data from NPUAP –EPUAP (2009). The data demonstrated a 42% decrease in HAPU in 2013 or after six months of implementing actions for the project. The team understood that at the end of the improvements, it is necessary to calculate new process control limits and make these limits the triggers for corrective and preventive action (Six Sigma Materials, n.d.).

These neurocritical care nurses summarized their personal and professional learning as follows:

- KNOWING is one thing
- UNDERSTANDING is another thing
- Nothing is great than EVIDENCE-BASE PRACTICE
- GREAT things come from SMALL beginnings
- TEAM work divides the task and multiplies the success
- CHANGE is easier when you know where you are going and why it's worth it.

### CONCLUSION

Patient safety has gone along way, from what started as a concern, this is now a discipline. New body of knowledge, improving science and supporting the learnings with evidences are just some of the imperatives for the change we have to move to keep our patient safe from most of the advance practices and technologies that also evolved. As nurses and healthcare providers we always bear in mind and conscience the Hippocratic Oath of "Primum non Nocera" (first, do no harm).

### CHECK YOUR PROGRESS

Assess your understanding of key points from the previous sections.

- WHO's simplest definition of patient safety states that this is the prevention of errors and adverse effects to patients associated with health care.
- There are ways to improve patient safety using these proposed paradigms: focus on reducing healthcare professional (HCP) errors; focus on reducing patient injuries; and focus on improving the use of evidence-based medicine
- Science is necessary to ensure that patients are safe; and no one discipline, or single theory alone will be enough
- Efforts should be exerted to identify the common factors contributing to error or adverse event so that a viable and appropriate solution can be developed.

**The key to the attainment of safety amongst the healthcare providers caring for the critically ill is:**

- A. The development of a culture of safety
- B. Being informed
- C. Having Team work dynamics
- D. Working alone and focused

**The safety project entitled "Beyond Turning: Reducing the rate of hospital-acquired pressure ulcer" utilized the following:**

- A. Design – Measure – Analyze – Improve – Control.
- B. Plan – Do – Check - Act
- C. Fishbone Analysis
- D. Failure Mode Analysis

### Answers:

The key to the attainment of safety amongst the healthcare providers caring for the critically ill is the development of a culture of safety. Safety culture is described as one that focused on preventing, detecting, and minimizing hazards and error without attaching blame to individuals (Kohn, Corrigan, & Donaldson).

The safety project entitled "Beyond Turning: Reducing the rate of hospital-acquired pressure ulcer" utilized the following: Design – Measure – Analyze – Improve – Control. These phases are the problem-solving methodology of the Six Sigma.



### QUALITY CONTROL

Quality is defined as a set of properties and characteristics of products, processes or services that relate to the possibility of meeting the stipulated or implied needs. That portion of the product or service with minimal costs in the life cycle contributes to a maximum of purpose and health of the people involved in its production, distribution, use, maintenance and recycling, and with a low cost of all resources, and with an acceptable impact on society and the environment. This includes quality of the integration of work and the integration of responsibilities. Total Quality Management (TQM) is a comprehensive and structured approach to organizational management that seeks to improve the quality of products and services through ongoing refinements in response to continuous feedback. Total Quality Management involves the user, the philosophy of management to ensure the leadership, training and motivation for the purpose of continuous improvement of organizational processes (John M. Kelly). Quality control is a function of management in which the work is monitored, measured and remedial action in order to meet anticipated organizational goals. Quality management is the measurement and correction of all procedures in the process of work, in accordance with the adopted plan and goals of health care.

#### The basic principles of TQM

- User determines the quality
- Top management leads and takes the initiative
- Elimination of variation
- Continuous improvement with the use of measuring instruments (data and facts).

Nursing standards are measurable definitions agreed and acceptable quality of nursing care at the specific workplace which is judged and evaluated current nursing practice. Define standards can be done by the head nurse or director at the level of institutions, but in every respect the most acceptable standards are adopted and accepted by all the nurses at the level of the Council, the Association or the other relevant institutions. They act as guidelines or objectives which determines whether the nursing activities certain quality. Standard defines a coherent level of quality and quantity of work. Standards are established rules that are used in

measuring or defining the quality and value of services or procedures. Standards must be clear, realistic, acceptable and understandable. Standards of medical care must be adopted by the nurses, and based on knowledge and scientific basis.

Continuous quality improvement is a tool for improving the quality of services provided by organisations. Continuous quality improvement refers to having a systematic approach to collecting and reviewing data or information in order to identify opportunities to improve the operations of an organisation with the end result of delivering better services to customer or clients. A common approach to continuous quality improvement is to see it as an ongoing cycle involving planning, doing, checking, identifying more actions and then starting again that is Demming cycle shown in Figure 8.

### QUALITY INDICATORS IN ICU

Full access to quality management it is possible to establish the implementation of the quality management system, defining the quality policy and procedures but which enable quality assurance and control. The principle of total quality management is a specific structure of an organization that provides services and products and at the same time striving to fully meet the needs of its clients. Quality indicators are quantitative measures of an important aspect of the service that determines if service set standards or requirements. Quality indicators are at the core of the program quality improvement together with the criteria for monitoring staff and show which parts of the standards achieved.

Quality indicators are measurable, objective, quantitative indicators of the effectiveness of key system elements. Indicators show us the extent to which the system meets the needs and expectations of users. Systematic collection and analysis of quality indicators is the obligation of all accredited institutions. Indicators should have a very clear and unambiguous definition and interpretation, and the measurability of indicators is an essential prerequisite for their successful establishment. They must be related to the quality of the key, strategic and supporting processes.

#### The most common quality indicators in ICU

- Nurse - patient ratio
- Skin integrity

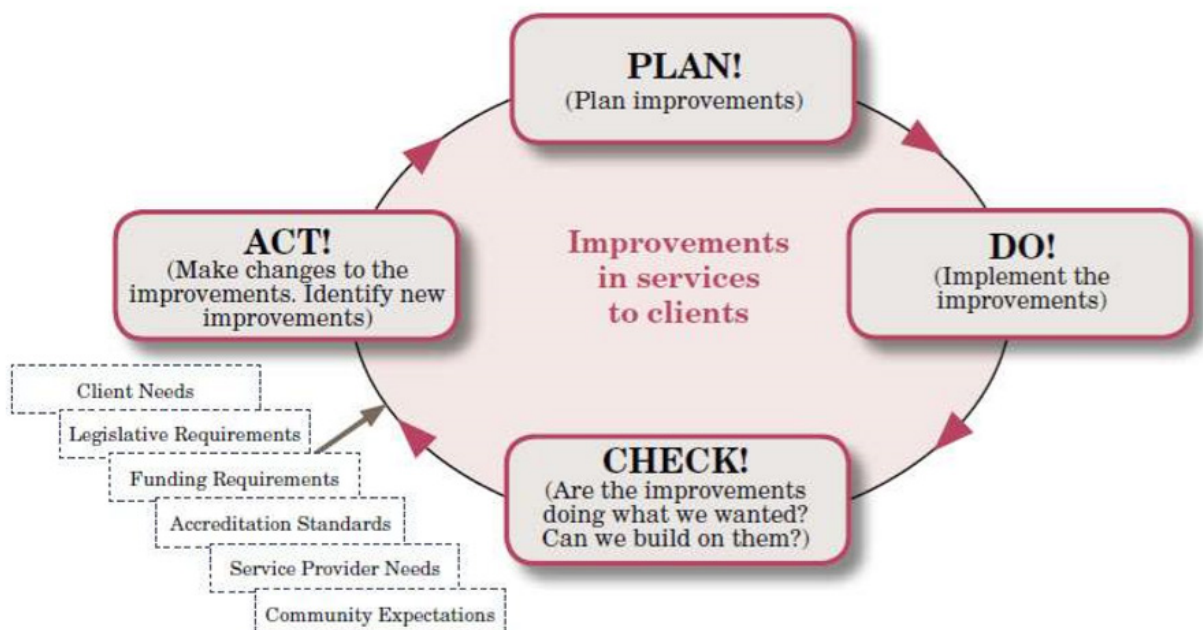


Figure 8. The Demming cycle

- The amount of health care provided to the patient during the day
- Patient satisfaction with pain therapy
- Patient satisfaction with provided information
- Patient satisfaction with nursing care
- Satisfaction of patient's overall health care
- Nosocomial infections
- Nurses' satisfaction

### REFERENCES

- Agency for Healthcare Research and Quality (2009). What is health care quality and who decides? Statement of Carolyn Clancy before the Subcommittee on Health Care, Committee on Finance, U.S. Senate.
- Annas GJ (2006). The patient's right to safety – improving the quality of care through litigation against hospitals. *The New England Journal of Medicine* 354(19): 2063-6.
- ASQ: The Global Voice of Quality. Fishbone (Ishikawa) Diagram. Excerpted from Nancy R (2005). Tague's The Quality Toolbox, Second Edition, ASQ Quality Press, pp 247–249. [Online]. Available at: <http://asq.org/learn-about-quality/cause-analysis-tools/overview/fishbone.html>.
- Berwick DM, Nolan TW, Whittington J (2008). The triple aim: care, health, and cost. *Health Affairs (Project Hope)* 27(3): 759-69.
- BusinessDictionary.com (2015). Six Sigma Definition. [Online] Available at: <http://www.businessdictionary.com/definition/Six-Sigma.html>.
- Coronado A (2014). Beyond Turning. Presented during the 2014 CCNAPI Convention on Quality Stories, Diamond Hotel, Manila, Philippines, 19 February 2014.
- Emanuel L, Berwick D, Conway J, Combes J, Hatlie M, Leape L, et al. (2008). What exactly is patient safety? *Advances in patient safety: new directions and alternative approaches* (Vol. 1: Assessment). [Online]. Available at: <http://www.ncbi.nlm.nih.gov/books/NBK43629/>
- Huber LD (2000). *Leadership and Nursing Care Management*. Saunders, Philadelphia, pp. 609-633.
- Institute of Medicine (2001). *Crossing the quality chasm: a new health system for the 21st century*. Committee on Quality of Health Care in America, Washington, DC, USA: National Academies Press. [Online]. Available at: <http://www.ihi.org/resources/Pages/Publications/CrossingtheQualityChasmANewHealthSystemforthe21stCentury.aspx>.
- Kohn LT, Corrigan JM, Donaldson MS (Eds) (2000). *To err is human: building a safer health system*. Washington, D.C.: National Academy Press. Cited in: Patient safety culture: the nursing unit leader's role. [Online]. Available at: <http://ojin.nursingworld.org/MainMenuCategories/ANAMarketplace/ANAPeriodicals/OJIN/Tabl eofContents/Vol-16-2011/No3-Sept-2011/Patient-Safety-Culture-and-Nursing-UnitLeader.html#Kohn>.
- Laskou M, Nikolaou H, Diamantea F, Vlahou A, Mathas C, Maguina N (2006). Iatrogenic complications in ICU patients. *Critical Care* 10(Suppl 1): P394. [Online]. Available at: <http://www.ccforum.com/content/10/S1/P394>
- NPUAP-EPUAP (2009). International guideline: pressure ulcer treatment technical report 2009. [Online]. Available at: <http://www.npuap.org/wpcontent/uploads/2012/03/Final-2009-Treatment-Technical-Report1.pdf>.
- Mitchell M (1994). How can we assure health care quality? In: J. McCloskey & H. Graces (Eds.). *Current issues in nursing*. Mosby pp. 287-94.
- Patient Safety (n.d.). Patient safety alliance. [Online]. Available at: <http://patientsafetyalliance.in/patient-safety/>.
- Pronovost P (n.d.). Making progress in patient safety. *Patient Safety*. [Online]. Available at: [http://www.who.int/patientsafety/news\\_events/news/edit\\_pronovost/en/](http://www.who.int/patientsafety/news_events/news/edit_pronovost/en/).
- Ravichandran N (n.d.). Health poverty and equity mechanisms in the Philippines. Institute of Social Medicine Research, New Delhi, India. [Online]. Available at: <http://www.asianscholarship.org/asf/ejournal/articles/Nataraj.pdf>.
- Reason, James T (1990). *Human error*. Cambridge, MA: Cambridge University Press. Cited in: *To err is human: building a safer health system*. Errors in health care: a leading cause of death and injury. [Online]. Available at: <http://www.ncbi.nlm.nih.gov/books/NBK225187/>.
- Six Sigma Materials (n.d.). Control. [Online]. Available at: <http://www.six-sigmamaterial.com/Control.html>.
- Steel K, Gertman PM, Crescenzi C, Anderson J (2004). Iatrogenic illness on a general medical service at a university hospital. *Quality and Safe Health Care* 13: 76–81. [Online]. Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1758071/pdf/v013p00076.pdf>.
- World Health Organization (2008). World Patient Safety Day. [Online]. Available at: <http://www.gov.za/world-patient-safety-day>.
- World Health Organization Western Pacific Region (2013). Human resources for health country profile Philippines. [Online]. Available at: [http://www.wpro.who.int/hrh/documents/publications/wpr\\_hrh\\_county\\_profiles\\_philippines\\_uploadv1.pdf?ua=1](http://www.wpro.who.int/hrh/documents/publications/wpr_hrh_county_profiles_philippines_uploadv1.pdf?ua=1).