Quality Indicators in Our ICU, a Tool for Improvement!

LAMIA HAMMED, M.D.*; WALIED KAMIL, M.B.B.Ch**; MAGED ABULMAGD, M.D.**; HESHAM ELAASAR, M.D.**; ALIA ABDUL FATTAH, M.D.** and SHERIF MOKHTAR, M.D.**
The Departments of Public Health* and Critical Care Medicine**, Faculty of Medicine, Cairo University.

Abstract

Study Objective: Patients included in the study were 96 consecutive eligible patients admitted to mixed medical/surgical ICUs between January, 2008 and March, 2008. Our objective was to use a consensus process to develop a preliminary set of quality measures to assess care in our ICU. We built on earlier efforts of the Spanish Society of Intensive Critical Care and Coronary Units (SEMICYUC), in May 2005 to propose specific measures of the structure and process of ICU care. We used an informal iterative consensus process to identify and refine a set of candidate quality measures.

Design: Retrospective cohort study.

Setting: Department of critical care medicine, Cairo university hospitals.

Patients: A total of 96 patients admitted to our ICU from January 2008 to March 2008.

Intervention: None.

Measurements and Main Results: This study was conducted to detect the implementation of a set of indicators that measure the quality of care in intensive care units (ICU) in Cairo university hospitals. The study was done for 3 months in 2 ICUs. All patients were studied for the implementation of the fundamental quality indicators (QI) that was previously published by the Spanish Society of Intensive and Critical Care and Coronary Units (SEMICYUC).

Our results showed that standards (6,14 and 17) were not applicable our ICU. Implementation of indicators 7, 15 and 18 were poorly applied in our ICU. Poor performance was defined as a score of less than 50% of the standard. On the other hand, all other indicators were implemented with different scores in our ICU.

Conclusion: As quality assurance become an important issue in modern ICU practice, ICU quality indicators has become a useful tool to measure ICU quality performance. Our ICU is still lacking implementing quality practice, we need intensive efforts to spread the culture of continuous quality improvement in our ICUs.

Key Words: Quality indicators – ICU Quality – Quality measures.

Introduction

INTENSIVE care constitutes only a temporary and relative brief period within a longer episode of acute care that may itself be a stage in a long-standing chronic illness. The objective of intensive care should be to save or sustain life during this critical period of illness in order to allow the patient a chance of recovering an acceptable quality of life for a reasonable period of time [1].

Recently, collaborative groups of health-care organizations, academics and businesses have formed to help fill the evidence-based policy-making void that exists in US health care. For example, the Leapfrog Group [2] is attempting to improve hospital outcomes for its employees by making high-intensity involvement of intensivists in ICUs a requirement for any hospital to contract with their health plans. Beyond thus however, Leapfrog, the Institute for Healthcare Improvement, [3] and the National Quality Forum [4] are all striving to encourage hospitals to effectively implement specific evidence-based and consensus-based best practices.

The ICU is an extremely complex organization involving different disciplines, many diagnostic and therapeutic procedures in a highly technological environment and most importantly at present, high costs, which represent a high proportion of hospital budgets. Therefore, in order to reach the objectives including a high quality of care and efficient use of resources a managerial approach to intensive care is mandatory.

This includes strategic planning to define the function of the ICU, volume and type of patients, the objectives of care delivered and the allocated
resources as part of the inputs. The outcomes are effectiveness (survival, residual morbidity, complication rate) and efficiency (associating costs with type and volume of patients and with utilization of resources). The relation between input and output is governed by the process of care, controlled by management variables [8].

Quality improvement is part of ICU management and involves efforts to improve the level of performance of key processes in the ICU.

There are generally three separate but sometimes somewhat overlapping targets for quality improvement: Structures, processes and outcomes [6]. Structural aspects of the ICU include organization, daily routine, (allocation of) manpower, equipment, infrastructure, documentation and level of training. There is evidence that the availability of a well-trained ICU staff has an important impact on outcome [7,8]. Many publications exist on the issue of quality improvement and outcome assessment [9,10] and a growing number are specific to critical care [11-19]. The improvement of the quality of health care has been a major concern for health care professionals for many years. The development of instruments that enable quality to be measured has been essential in the transformation of this concern into a way of working. Once it became possible to measure, the focus shifted from quality control to quality assurance. Later, from the 1990s, we have progressed toward total quality systems. The first documented events in the history of the assessment of quality of care date to the second half of the 20th century, when Florence Nightingale studied the mortality rates of military hospitals during Crimean war. Another noteworthy event was the creation of the Joint Commission on the Accreditation of Hospitals (JCAH) in 1951. Later, the establishment of MEDICARE and MEDICAID, federal programs to provide healthcare to the elderly and economically disadvantaged, in 1965 and 1966 and the stipulation that only hospital with JCAHO accreditation would be recognized by these programs. The practical application of theoretical formulations on quality in healthcare has taken place in many countries around the world.

There are two basic approaches to the evaluation and improvement of the quality of care:

A- The so-called room for improvement model that begins with the identification of problems, followed by their analysis and proposals for improvement, conceptually based on Edward Deming’s cycle of evaluation and improvement, better known as PDCA (Plan, Do, Check, Act).

B- Monitoring systems, used to detect problems and periodically evaluate performance, the fundamental elements of which is the INDICATOR.

All indicators must comprise the following three characteristics or properties:

1- Validity: An indicator is valid when it fulfills the aim of identifying situations in which quality of care can be improved.

2- Sensitivity: When it detects all cases in which a real situation or problem with quality of care occurs.

3- Specificity: When it only detects those cases in which there are problems related to quality of care.

Critically ill or injured patients are almost routinely admitted to the ICU where continuous monitoring and life-support techniques are available and comprehensive treatment, as well as continuous care by trained physicians and nurses, can be provided. The ICU has become an integral part of hospital patient care. It is a complex organization involving different disciplines, high technology and many diagnostic and therapeutic procedures. Patient outcome, not limited to survival but also related to residual disability and quality of life, as well as the effectiveness of treatment and efficiency of intensive care have become major issues. The quality of care provided has a significant impact on these variables and continuous improvement of the quality of intensive care is the challenge for the years to come.

Material and Methods

Study population:

This is prospective cohort study conducted at the critical care department, over the 3 month in 2 different units at the same department. We assigned one full time resident (to avoid interobserver error) for data collection using the fundamental indicator form the following exceptions: Individuals <16 years of age; burn patients; patients admitted solely for hemodialysis or peritoneal dialysis; patients who die within 1h of admission to the ICU or within the first 4h after admission to the ICU in cardiopulmonary arrest; patients undergoing diagnostic coronary angiography and patients undergoing coronary artery bypass, cardiac valve, or heart transplant surgery.

Statistical methods:

Statistical analysis was done using SPSS software for windows, version 12.0 (SPSS Inc., Chicago IL, USA). Continuous data are presented as mean ± SD or median. Categorical variables were
reported as absolute numbers (frequency percentages). Calculation of each indicator has been performed using the standard equation for each one. However we used our own database to get the denominator.

**Results**

This prospective cohort study conducted at the critical care department; in addition to the fundamental quality indicators the following variables were analyzed: Age, sex, outcome, in addition to length of ICU stay. A total of 558 pt were admitted over 3 month excluding those who stayed <24 hours and those who were admitted for diagnostic procedures (e.g coronary angiography). The mean age of studied population was 56+17.4, 67.7% were males; the mortality rate was 19%. The mean length of ICU stay was 11.5+15 days, median was 10.

**Indicators analysis:**

<table>
<thead>
<tr>
<th>Fundamental indicator</th>
<th>Score</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early administration of acetylsalicylic acid (aas) in acute coronary syndrome (acs)</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Early reperfusion techniques in stemi</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Semirecumbent position in patients undergoing invasive mechanical ventilation</td>
<td>90</td>
<td>97</td>
</tr>
<tr>
<td>Prevention of thromboembolism</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>Surgical intervention in traumatic brain injury (hi) with subdural (sdh) and/or epidural hematoma (edh)</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Monitorization of intracranial pressure in severe traumatic brain injury with pathologic ct findings</td>
<td>NA</td>
<td>95</td>
</tr>
<tr>
<td>Pneumonia associated to mechanical ventilation</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>Early management of severe sepsis-septic shock</td>
<td>80</td>
<td>95</td>
</tr>
<tr>
<td>Early enteral nutrition</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Prophylaxis against gastrointestinal hemorrhage in patients undergoing invasive mechanical ventilation</td>
<td>91</td>
<td>95</td>
</tr>
<tr>
<td>Appropriate sedation</td>
<td>70</td>
<td>85</td>
</tr>
<tr>
<td>Pain management in unstable patients</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Inappropriate transfusion of packed red blood cells</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Organ donors</td>
<td>NA</td>
<td>60</td>
</tr>
<tr>
<td>Compliance with hand-washing protocols</td>
<td>40</td>
<td>90</td>
</tr>
<tr>
<td>Information to patients/families in the icu</td>
<td>95</td>
<td>100</td>
</tr>
<tr>
<td>Withholding and withdrawing life support</td>
<td>NA</td>
<td>100</td>
</tr>
<tr>
<td>Perceived quality survey at discharge from the icu</td>
<td>30</td>
<td>80</td>
</tr>
<tr>
<td>Presence of an intensivist in the icu 24hrs/day</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Adverse events register</td>
<td>95</td>
<td>100</td>
</tr>
</tbody>
</table>

NA: Non Applicable.

**Discussion**

The goal of intensive care is to provide the highest quality treatment in order to achieve the best outcomes for critically ill patients. Performance measurement involves the collection of data to evaluate an ICU’s performance against itself (over time), against other ICUs or appropriate benchmarks. Successful performance assessment requires the quantification of relevant indices of performance that provide a more precise and accurate evaluation of the severity of illness and the likelihood of survival. But although intensive care medicine has developed rapidly over the years, there still exists little scientific evidence as to what treatments and practices are effective and efficient. Under ideal circumstances, economic pressures and financial constraints can have a positive impact on health care delivery, as processes and structures can be streamlined and waste and redundancy eliminated without reduction in quality of care [20]. Improving ICU performance involves the following sequential steps: (1) measuring indexes of ICU performance relevant to the topic or area of interest; (2) making interventions aimed at improving those measures and then (3) re-measuring the indexes to document the effect of the intervention [21].

To our knowledge, this may be the first study to evaluate the ICU performance using the fundamental quality indicators that were published by the Spanish Society of Intensive Critical Care and Coronary Units (SEMICYUC). A variety of tools and tips will aid each institution in adapting the details of change concepts to fit local environments and gain acceptance of local practitioners while maintaining the integrity of the core change concepts. Understanding the Model for Improvement
and Bundles, along with the development of strong improvement teams, is critical to the success of improving care of critically ill patients.

The findings of the current study have important implications for the delivery of critical care and the assessment of health-care quality, but also raise further questions. While some studies have suggested that greater ICU specialization may be associated with better outcomes, current uncertainty about the value of regionalizing high-intensity, critical care services stems, in part, from the lack of valid ICU performance data in most regions [22,23].

The current findings suggest that small, but clinically meaningful differences may exist across institutions. Directing care preferentially to such institutions may be associated with improved outcomes on a community-wide basis.

For further quality improvement in our unit, we can recommend the following:

1. Organizations motivating use of quality indicators to help us determine those aspects that can be improved.
2. Implementation of quality improvement measures will result in effective delivery of appropriate healthcare to the critically ill patients.
3. It is essential that an ICU formulates the standards for its organization on the basis of data from the literature.
4. Implementation requires discussions and ultimately consensus between all members of the ICU staff.
5. A structured quality management system focusing on the optimal use of resources and optimal performance of the ICU is essential in the process of quality improvement.
6. Appropriate use of quality indicators may help to identify problems and to develop methods to improve performance over time.
7. The use of different indicators serve to assess both process and outcome quality and if well standardized these could become valuable tools for comparing one ICU with another.

Limitations of the study:

1. The study is a single center study and thus the information of limited generability.
2. From 120 quality indicators, we used only 20 indicators (fundamental quality indicators) for benchmarking.

Conclusion:

Although quality improvement may seem overwhelming at first, approaching a project in a stepwise manner can help to ensure that quality improvement becomes routine in our ICU. ICU quality indicators has become a useful tool to measure ICU quality performance. Our ICU is still lacking implementing quality practice, we need intensive efforts to spread the culture of continuous quality improvement in our ICUs. Quality improvement efforts require scientifically sound performance measures. Just as in clinical research, sufficient resources must be allocated to ensure a robust data collection, analysis and reporting system.

References


