

Measuring quality and outcomes in intensive care

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Abstract

Whilst quality measures are integral to the maintenance of a high standard of patient care, high-quality care remains a complicated concept to define in the context of acute care. In this article we explore how quality can be measured in the intensive care unit. Standard outcome metrics such as mortality are tangible comparators, but do not offer a comprehensive assessment of quality for the complex heterogeneity of the Intensive care population. We explore the Donabedian model as a means to describe the importance of outcomes, processes, structure and environment to inform the measurement of quality. These concepts can be more abstract and difficult to measure but can provide significant insight into the culture of a unit and the resulting performance, and thus provide a more comprehensive measure of quality.

Keywords Donabedian model; hospital culture; hospital key performance indicators; ICNARC; intensive care; intensive care stakeholders; quality; staff surveys; standardized mortality ratio

Introduction

As patients' pathologies and interventions become increasingly complex, the measurement of quality becomes both more important and more difficult. Ultimately we all strive to deliver the best possible care for our patients. To continue to do this we must be able to define, assess and continually improve the quality of care we deliver.

Quality is so central to our actions that understanding what a speciality considers high quality, and particularly how this is measured, gives a unique insight into the motivation behind what is considered 'best practice'.

It is not adequate to make assumptions about quality from simple and lone outcomes such as mortality rates. Just as in surgical specialities, these measurements provide just a fraction of the picture and are unreliable markers for the actual quality of

care being provided in an intensive care unit. Both surgery and intensive care stays are emotionally charged parts of the patient journey that are heavily scrutinized. They often have unfavourable outcomes despite high-quality care. This continues to highlight the importance of demonstrating how quality is being delivered.

In this article we will consider the various measures of quality and outcome used in intensive care units with particular reference to our experience of practice in the National Health Service in the United Kingdom.

Defining quality in healthcare

A great deal of the complexity in measuring quality comes is a result of the fact that there is no single definition of quality. In reality the answer varies greatly on the values of the individual or organization asking the question.

There are many stakeholders in the realm of intensive care who have an interest in ensuring that care is of high quality (Figure 1). Each have their individual ideas of what this should involve. ICU clinicians and staff may consider low nosocomial disease rates a good measure of quality, whereas patients and their advocates may have an understanding of the importance of these rates but value quiet time, visiting hours and analgesia as higher measurements of 'quality'.

Other stakeholders such as students and academics may value cutting edge research and techniques. Also, it is naïve to ignore that a unit must be run practically. Trust boards, commissioners and tax payers all value the efficient use of public funds in an undoubtedly expensive field of practice.

Many attempts have been made to summarize these perspectives into a unified definition of quality of care. The Institute of Medicine defines it as:

*"...the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge."*¹

Structured assessment of quality – the Donabedian model

This definition of quality is based on outcomes. However, comprehensive assessment of quality includes how an organization is structured, the processes it employs and the performance of its staff to achieve these outcomes (Figure 2).

The idea of classifying quality into outcomes, process and structure was initially introduced by Donabedian² in the 1980s and remains a standard in quality assessment today. All three areas are closely interdependent. Assessing quality in each has its own advantages, disadvantages and pitfalls. Using all of these elements to assess quality not only gives a clearer picture of the situation but allows for identification of areas of improvement, which is of course the final aim.

Outcomes in intensive care

Clinical outcome measurements are widely used as quality indicators for good reason. Outcome data is tangible, quantitative and easily accessible. Outcomes such as mortality rates are the original and fundamental measurements in quality and translate well across specialties.

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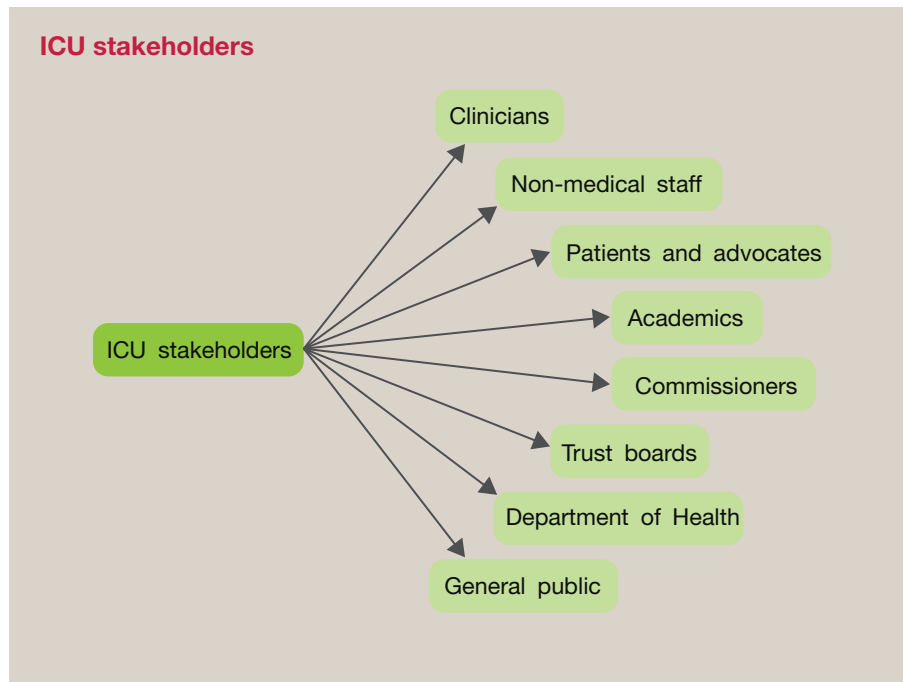


Figure 1

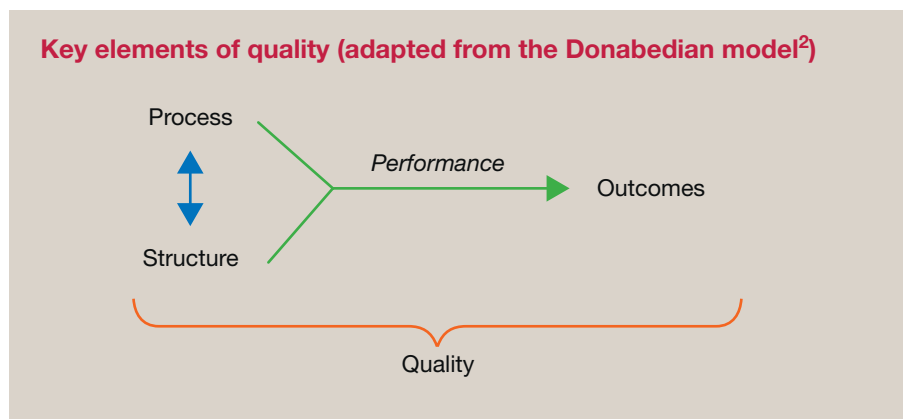


Figure 2

Despite this, outcome data is far from comprehensive in quality assessment. Single datasets are essentially useless without context. For example, the heterogeneity of the ICU patient population across specialities and other confounding variables makes mortality, as a single entity, a poor comparator. Broadening data collection increases the ability to resolve the reality of care delivery.

In the United Kingdom this is achieved by the *Intensive Care National Audit and Research Centre Case Mix Program* (ICNARC – CMP). All general adult intensive care units in the NHS participate in the ICNARC-CMP and submit a 62-point dataset for each patient admitted³ (Figure 3).

The ICNARC programme was launched following the success of the Intensive Care Society's APACHE II study,⁴ which applied the American APACHE II equation to ICU data from centres across the UK. This allowed the comparison of units by their predicted versus actual mortality rates. ICNARC was designed to

complement the APACHE II model, which has since been further calibrated to reflect ICU outcomes as they evolve in the UK. Over 1.5 million patient datasets have been collected to date.

Data about patient demographics and disease severity can be used in models to predict mortality rates in a unit. These can be compared to observed mortality to calculate standardized mortality ratios (SMR). An SMR is arguably far more representative of care quality than a mortality rate alone, and provides a tangible comparator of performance between similar units.

ICNARC data includes many other key performance indicators including readmission rates, inter-hospital transfers, out-of-hours discharges and early/delayed discharges.

Intensive care units also record other data beyond ICNARC requirements. This includes nosocomial infection rates (ventilator associated pneumonia, MRSA and *C. difficile* in particular), intervention complication rates, quality of life indicators and usage statistics (such as elective surgery cancellations).

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