Providing quality care to patients in intensive care units (ICUs) is vital, as these units are expensive and in limited supply. Preventable deaths in ICU patients represent not only a human cost, but also a waste of valuable resources. As such, the outcomes of patients admitted to ICUs are often closely examined to ensure these expensive resources have been utilised appropriately. ICU readmission rates are commonly used as a marker of care quality, but this creates significant problems. For example, readmission rates may reflect care delivered after ICU discharge and not before. Furthermore, readmission rates may highlight that resources aimed at improving patient outcomes, such as critical care outreach teams, are actually working. This paper describes the limitations of using ICU readmission rates as a marker of care quality.

The quality of care delivered to intensive care unit (ICU) patients and their outcomes are of significant interest to researchers, clinicians and policy-makers. There are many reasons for this; one is the global and chronic shortage of ICU beds, while another is the huge expense associated with providing ICU services. In the UK, for example, an estimated £719 million is spent funding ICU services every year.1 It is therefore essential that quality care and safety be maintained during the care continuum, as preventable deaths in ICU patients represent, among other things, a significant human cost and a waste of expensive healthcare resources.2

Quality of care and patient safety underpin many health-related policies and professional codes of conduct, as well as being major determinants of patient outcomes. These outcomes are frequently used as key performance indicators or to determine the distribution of healthcare funds. Measuring the performance of ICUs is challenging, however, as these units are dynamic systems and some of the most complex environments of all healthcare facilities.3

One of the most commonly cited ICU outcome measures is the readmission rate. This may be used as an indicator of ICU quality or of the processes of care between ICUs and hospital wards. Numerous professional bodies cite readmission rates as a clinical indicator, including the Intensive Care Society, the Society of Critical Care Medicine, and the Australian and New Zealand Intensive Care Society.4–6 The definition of ICU readmission varies though between these professional groups, ranging from readmission within 48 hours of discharge to a second or subsequent ICU admission during the same hospitalisation. The Australian Council on Healthcare Standards, for example, states that adverse events occurring within 72 hours of ICU discharge are linked to care within ICU, while events occurring after this time are considered to reflect care on the wards or other factors.7 If ICU readmissions are to be used as a measure of care quality, it is essential that a rigorous, transparent definition be used. This will allow deficits in clinical care to be easily identified and strategies implemented to prevent their recurrence.

As with any measure of care quality, ICU readmissions have distinct limitations. The aim of this paper is to highlight the conceptual problems inherent in examining ICU readmissions and using them as a key performance indicator. This paper serves to inform clinicians, researchers and policy-makers of issues to consider when using ICU readmission rates as a measure of care quality, and proposes an alternate definition of ICU readmission.

**READMISSION DEFINITION**

Numerous studies examining ICU readmissions have been conducted over the past three decades. The common definition of ICU readmission in these studies is a second admission to ICU during the same hospitalisation.8 This definition is problematic, however, and should be used with caution. The main limitation is that subsequent (or second) admissions to ICU are often elective and planned, such as the second stage of a major surgical procedure. For example, an Australian study of more than 76,000 ICU admissions found that nearly a third of ICU readmissions were elective surgical patients undergoing second-stage procedures.9 These readmissions are not the result of suboptimal care, but are instead a continuation of planned surgical treatment and may thus give a false or misleading view of care delivery. The inclusion of these readmissions in outcomes data is therefore questionable.

The importance of differentiating between elective and emergency postoperative patients when reviewing the outcomes of ICU patients has been highlighted. In a prospective observational study of more than 1800 ICU admissions in Israel, patients undergoing emergency admission had greater acuity of illness, required longer postoperative mechanical ventilation and experienced longer ICU lengths of stay.10 ICU readmissions may therefore not reflect care quality if factors unique to individual patients (e.g. illness acuity, age, presence of comorbidities) influence their outcomes, independent of the care given; a number of studies have shown this to be the case.11–13 These factors must be considered when reviewing ICU readmission data in the context of care quality.

To overcome the confounding influence of comorbidities, some researchers have classified ICU readmissions as being either due to the same problem (i.e. the issue that caused the first ICU admission) or the development of a new problem.13 In a study of 2352 readmissions to 28 hospitals in North America, for example, the diagnosis responsible for the first ICU admission and the subsequent readmission was identical in less than 20% of patients.14

If a patient develops a new clinical problem requiring a second ICU admission, the development of this problem may not be due to care quality during the first ICU admission. The new problem could simply be a natural progression of the disease, such as hydrocephalus following subarachnoid haemorrhage. But if the patient is readmitted to the ICU for the same reason as the first admission,
this may be due to a breakdown in continuity of care between the ICU and the wards. It is these readmissions that may be the most sensitive marker of care quality, as they may be a more accurate reflection of care delivery.

ILLNESS ACUITY

A patient may survive a critical illness with the support of an ICU admission, but die soon after on a ward because of a natural progression of their disease process. An outcome such as this could be interpreted as poor post-ICU care, given that disease progression is difficult to quantify. Similarly, if such a patient does not die on the ward but is readmitted to the ICU, the specific cause of the readmission may be difficult to determine. For example, was the patient readmitted because of the natural development of respiratory failure or because of a breakdown in continuity of care? If an ICU readmission is due to a new clinical problem, factors specific to the patient may also contribute.

Patients admitted to acute-care hospitals (and ICUs) are likely to become seriously ill during their admission because of the complexity of their condition.15,16 Patients are also often elderly, with associated comorbidities and a decline in physiological reserves. In addition, advances in medical techniques mean that patients who once would not have survived a critical illness now survive to ICU discharge. All of these factors mean that patients on hospital wards (particularly those just discharged from the ICU) are challenging to care for and require more complex levels of care than patients in the past. If the skill mix of ward staff does not meet patients’ care needs then patients may not receive the care required, resulting in clinical deterioration and a return to intensive care. However, the staff skill mix on the wards is beyond the control of ICU staff, as is the quality of ward care delivered. This is an example of an issue unique to the ward environment that must be considered when reviewing readmission rates, particularly if readmissions are assumed to reflect care delivered in the ICU.

CARE CONTINUITY

An examination of the use of outcomes for ICU evaluation and improvement emphasised that ICU outcome measures must account for effects caused by continuity (or discontinuity) of care.17 Communication or handover problems have been identified between ICUs and general wards, and may be a significant contributor to discontinuity of care and thus readmissions.18 A study of more than 10,000 patients admitted to a surgical ICU in North America found that some ICU readmissions were caused by a delay in initiating respiratory care on the ward immediately after ICU discharge.19 These readmissions may reflect care quality on the wards, but they not reflect care delivered in the ICU – although they may be indicative of the quality of the patient handover.

It can be argued that patients readmitted to the ICU after a certain timeframe should be excluded from ICU outcome data.20 For example, a patient could experience a fall while in the ward 10 days after ICU discharge, resulting in an acute subdural haematoma necessitating a second ICU admission. If the patient’s first ICU admission was due to respiratory failure or sepsis then there will be no clear relationship between the two ICU admissions. This is the limitation to defining readmissions as any subsequent admission to ICU during the same hospitalisation. If ICU readmissions are going to be considered a marker of care quality, then it must be clear where the care has been sub-optimal (or fallen below acceptable standards).

An ICU readmission can therefore reflect poor care on the wards rather than poor care before ICU discharge. In addition, readmissions can reflect ICU discharge processes, as the discharge of some high-risk ICU patients to a ward (instead of a high-dependency unit) increases the chance of clinical deterioration for these patients.21 In a study conducted in a 14-bed ICU in the UK, only 15% of ICU readmissions were related to the pathology of the first ICU admission, confirming the belief that the patients’ initial discharge from the ICU was appropriate.22

TIME OF DISCHARGE

A study of 1613 cardiac surgery patients admitted to the ICU in a tertiary hospital in Israel found that nearly half of all ICU readmissions occurred within 24 hours of discharge.23 ICU readmissions that occur this quickly can have numerous causes, including disease progression (rather than poor quality care), incomplete resolution of a critical illness and premature ICU discharge because of a bed shortage. Premature discharge from the ICU may expose patients to inadequate levels of care and place them at risk of clinical deterioration.14 It is possible, however, that such deterioration would occur even if the patient remained in the ICU for longer. In another study of 95,000 ICU patients in 22 Australian hospitals, 75% of readmissions occurred within 7 days of ICU discharge.9 These readmissions could be due to the development of a new disease process independent of the care provided. If the ICU discharge was deemed premature, however, this could reflect poor bed management rather than poor care in the ICU or on the wards.

TIME OF READMISSION

Some discharges from ICU are premature or unplanned, and this is commonly due to the high demand for ICU beds.24,25 Premature ICU discharge implies patients were discharged before they should have been or were well enough to no longer require intensive care. If a patient is discharged prematurely from an ICU, it is easy to apportion the blame for this to ICU staff. ICU staff could be questioned as to why some ICU discharges occur after hours (e.g. after 20:00 hours), given that these patients have poorer outcomes than those discharged during daylight hours.26,27

It is unlikely, though, that ICU staff willingly discharge patients prematurely. Senior ICU staff are undoubtedly aware that premature or after-hours ICU discharge places the patient at risk of readmission and other adverse events, particularly if the patient’s critical illness has not completely resolved. However, if an ICU bed is needed for a more acutely ill patient then ICU staff may have little choice than to discharge another patient after hours or prematurely.28 Later readmission of these patients to the ICU may not reflect poor clinical care, but poor bed management at the higher administrative level. It may also reflect the limited resources available to clinicians at the bedside.

Pilcher et al. have suggested that after-hours discharges may be reduced (and outcomes improved) by providing more ICU beds.29 This is a simple solution and an obvious one. It confirms the hypothesis that after-hours ICU discharges are an economic or administrative issue, rather than being down to poor clinical care. ICU staff should not be blamed for a shortage of ICU beds or other resources, and may struggle to provide quality care with the limited resources available to them. But a shortage of resources is not apparent when ICU readmission rates are cited.
Because of the increasing acuity of hospitalised patients in tertiary-care hospitals, many resources have been developed to help ward staff in providing acute care. These resources also provide assistance to ward staff when caring for patients discharged from ICUs. Examples include outreach teams, patient-at-risk teams and ICU liaison nurses.

The main goal of these resources is to improve patient outcomes and provide support to ward staff when caring for post-ICU patients. However, some of these resources may actually increase ICU readmission rates by ensuring they occur in a timely fashion (i.e. before the patient dies on the ward) rather than preventing them entirely. An increase in readmission rates after these resources are implemented locally may therefore reflect better care rather than worse.

METHODOLOGICAL ISSUES

For a clinical problem to be examined, a clear definition of the issue under investigation needs to be articulated. A research question should clearly identify the variables under investigation, specify the population being studied and imply the possibility of empirical testing. More than 20 studies examining ICU readmissions have been published over the last three decades, highlighting the importance given to this clinical problem as an outcome measure and area of clinical concern. Any of these studies have used the same data-collection method: retrospective review of medical records. But this research method has significant limitations.

Although medical records are commonly used as a source of research data, the documentation within them is widely recognised as being vague, incomplete and subjective. Medical records may therefore contain little useful information about why the patient deteriorated or required a second ICU admission. These records may also provide little insight into the quality of care delivered. Readmission data based on information extracted from medical records alone should therefore not be considered in isolation, as these rates may reflect nothing more than the quality of documentation (as opposed to the quality of care). Other data should be collected (or other methods used) to confirm what is contained (or implied) in medical records.

A further limitation of studies on ICU readmission is that many cite the medical diagnosis on readmission, but not the underlying cause of the patient’s deterioration. This may be because the actual cause is very difficult to identify due to the complexity of care delivery and its many influencing variables. To assume that ICU readmission rates reflect care quality places clinicians in a vulnerable position; ICU staff cannot be responsible for care provided on the wards, while ward staff cannot be responsible for care provided in the ICU.

Patients discharged from ICUs should ideally be sent to a high-dependency area rather than a ward environment, particularly if their critical illness has not completely resolved. This allows an increased level of care (that the patient still requires), which wards are not resourced to provide. A hospital that does not have a high-dependency unit may therefore have higher ICU readmission rates than one that does.

ICU readmission data may therefore reflect only resource availability, not care quality. This issue must be taken into account when reviewing ICU readmission rates.

CLINICAL SIGNIFICANCE

Intensive care medicine is both resource- and labour-intensive, and patients are often complex and at high risk of adverse events. Patients are often admitted to the ICU in a moribund state, providing a unique challenge for the clinicians attempting resuscitation. Some deaths in the ICU are thus inevitable and, as such, ICU mortality rates may not be a valid reflection of care quality. But when as many as 9% of patients die after ICU care but before hospital discharge, questions may be raised about the quality of care provided or the benefit of the ICU admission in the first instance. A 5-year study in one British hospital found that of 153 patients who died on wards after ICU discharge, 20% were expected to survive.

Quality indicators are increasingly being used in healthcare to support and guide improvements in care quality. But quality in healthcare is difficult to define and quantify. Patient outcomes after ICU discharge are often cited as markers of care quality. If these outcomes are poor then the validity of spending vast healthcare funds on critically ill patients may be challenged. But if this occurs, an examination of post-ICU care must also be conducted to identify where the true cause of the problem exists.

An ICU readmission should not necessarily be considered an adverse event or marker of poor care quality. ICU readmissions may actually indicate that safety systems (e.g. critical care outreach teams) are working effectively. It is known that patients readmitted to ICUs have worse outcomes than those not readmitted, although currently this is only reflected in statistical data. It is not clear whether there is a clinical difference in outcomes between these two groups; all patients may die on the ward after ICU discharge without being readmitted. These patients may have received better care, as the question of whether to resuscitate may have been asked of the patient or his or her family.

Some patients readmitted to ICUs who later die may have received a more dignified death if they had been asked the same question. ICU readmissions may therefore reflect a patient cohort that should have received better care - but, as they did not, a return to the ICU was inevitable. Further research is needed to confirm whether this is true, but such research will need a rigorous definition of ICU readmission. If these patients die despite their readmission and it is speculated they would have survived with better care, then those patients should be identified and targeted on the wards (e.g. followed closely by outreach teams). If these deaths were considered inevitable despite the care received then this also represents a group of patients worthy of identifying, as such patients can be spared the expense of a second ICU readmission (and the bed can be used for a patient with a better prognosis).

One of the current definitions of ICU readmission is a second admission to the ICU within 72 hours of the initial discharge. Any subsequent admissions to the ICU after this time that are labelled a readmission should be challenged. Furthermore, patients who have a planned subsequent admission to the ICU during the same hospital stay for the second stage of a surgical procedure should not be included in outcomes data; these admissions are not caused by a breakdown in care quality. Only ICU readmissions that are due to inadequate care should be labelled as readmissions. If the inadequate care was on a hospital ward then these readmissions should be included in data reflecting ward care, not care within the ICU.

CONCLUSION

Intensive care is one of the most costly areas of hospital care today. As such, it is vital that ICU patients receive quality care both during their ICU admission and following dis-
charge to a ward. ICU readmissions are commonly used as a marker of care quality. This is inherently problematic, as the validity of the commonly used definition of ICU readmission is questionable. There is also the problem of who is actually responsible for, or what causes, readmissions. If ICU readmissions are going to be used as an outcome measure then a more reliable definition is needed, as well as more rigorous ways of determining where the cause of the problem truly exists. If readmission rates reflect care quality then the natural question to ask is: who is to blame for poor care?

Blaming staff contributes little towards resolving the actual problem. ICU readmission rates and many studies of this problem fail to reflect the challenging conditions under which staff deliver care. Readmission rates do not reveal the many factors that influence patient care, such as staff shortages or workloads, although they are quite likely to be caused by them. This must be considered when reviewing ICU readmission data.

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