Safety in the acute medical unit: the role of severity of illness, structure of communication and staffing

Acute medicine is a young specialty that is just over 10 years old. The concept of risk in the acute medical unit has not been systematically described before.

Risk can be related to the characteristics of patients admitted, the organizational set-up and staffing levels. Patients are usually sickest on admission to hospital. Quantification of risk at the front door, early triage and proactive treatment of the sickest patients might mitigate some of this risk.

Shift systems for doctors and nurses, multidisciplinary and multiprofessional working make information management a major risk and require sharing of information and clear lines of responsibilities. Robust systems to handover safety-critical information within the acute medical unit and with other departments are crucial for patient safety. Low numbers of staff outside office hours and during weekends only compound these challenges.

Introduction

'Primum non nocere – above all, do no harm' (Thomas Sydenham, 1860)

Acute medical units were developed to streamline patient care and facilitate access to senior decision makers and investigations. But despite evidence that acute medical units lower hospital mortality for comparable patient groups (Coary et al, 2014), acute medical care is never far from the headlines. Management of unstable patients outside intensive care has been the subject of a number of landmark reports in the last 2 years.

This article highlights the risks of working in acute medical units, by collating information from the relevant literature and examining the key challenges for safe working in the acute medical unit.

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Safety and errors

Patient safety is integrated into all aspects of a patient's journey through the health system. It is the responsibility of all those involved in this process, from clerks to doctors, to help minimize the risks to patients. Following the *To Err is Human* report into error by the United States Institute of Medicine (1999), and the UK Department of Health's (2000) publication of An *Organisation with a Memory*, Vincent (2006) defined patient safety as:

'The avoidance, prevention, and amelioration of adverse outcomes or injuries stemming from the process of healthcare.'

Harm in the NHS

In 2000, the Chief Medical Officer for England estimated that 60 000–225 000 NHS patients suffer disability or death as a complication of health care (Department of Health, 2000). Hogan et al (2012) concluded that a significant proportion of the inhospital deaths reported was preventable. The National Patient Safety Agency (2013) for England and Wales reported that there were over a million safety incidents recorded in acute and general hospitals.

The Royal College of Physicians (2011b) suggested that factors which may compromise timely, high-quality care to patients largely relate to staffing, case mix and the organization of care. This article examines confounders of safe care in the acute medical unit with the intention of reducing adverse outcomes and improving safety.

Methods

The authors used process mapping of patients' journeys from admission to the acute medical unit to transfer off the acute medical unit (*Figure 1*) to identify potential themes for risk (Trebble et al, 2010). Themes were then further explored in the literature. Identified risks were matched with potential mitigating factors.

Results

Risk at the front door

Keogh (2013) estimated that over 90% of deaths in hospital happen when patients are admitted in an emergency, rather than for a planned procedure, with admissions at the weekend and at night particularly problematic. This means that risk management should focus on the acute medical unit.

Patient factors

Risk through case mix of patients admitted to the acute medical unit

Patients presenting to the acute medical unit as emergencies reflect the whole spectrum of illness severity, from ambulant to critically ill, and may have a fluctuating clinical course. Physiological abnormalities such as low blood pressure, high respiratory rate, tachycardia and hypothermia are associated with an increased risk of death, intensive care admission or cardiopulmonary arrest. Evidence suggests that the majority of patients have their most abnormal vital signs on admission to hospital (Subbe et al, 2001). This supports the colocation of acute admissions in a single location in the acute medical unit supported by senior staffing.

Catastrophic deterioration of patients suffering cardiopulmonary arrests in hospital is often preceded by physiological abnormalities which are recorded but not acted upon (Schein et al, 1990). In the same way the National Confidential Enquiry into Patient Outcome and Death (NCEPOD) (2005) report *An Acute Problem* found that patients were admitted to UK critical care units after up to 72 hours of documented instability. This phenomenon of deteriorating patients who are not escalated or escalated with significant delays has been described as 'failure to rescue'.

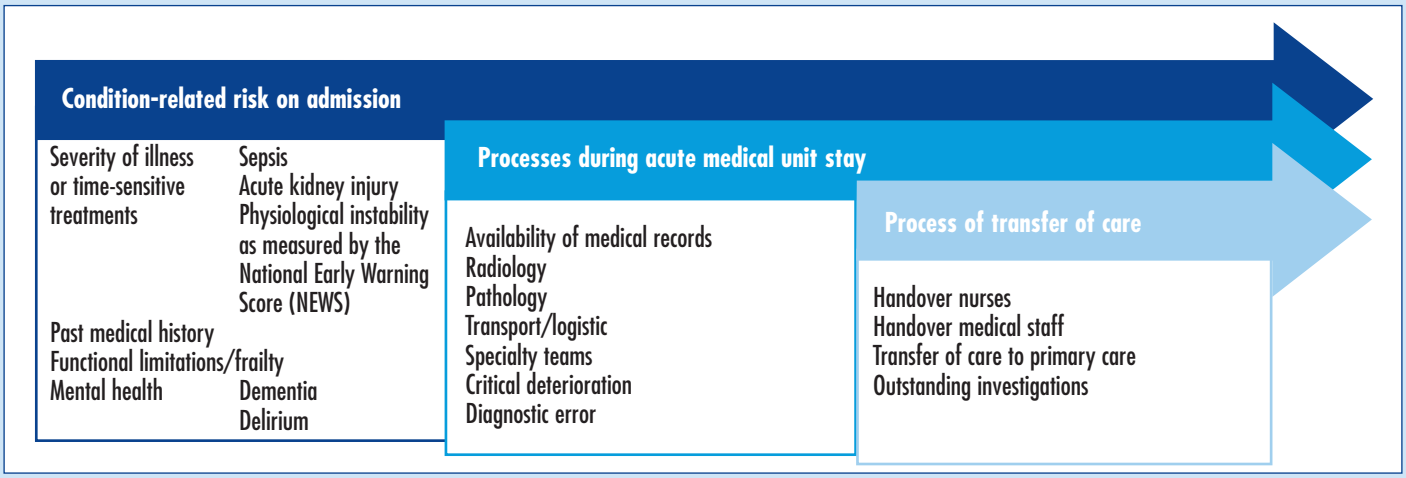

Figure 1. Risk to patients in the acute medical unit on admission, in the acute medical unit and during transfer of care.

In the Society for Acute Medicine's Benchmarking Audit '13, 22% of patients in acute medical units would have triggered a local early warning score but only a tiny proportion of these were referred to a critical care-based service (Le Jeune et al, 2013).

In addition to physiology, patients' risk can be described by their burden of chronic disease and functional dependency or frailty. Frailty is a measurable syndrome with a reduced ability of patients to compensate for physiological stimuli (Rockwood et al, 2005) and performs better than measures of cognition, function or comorbidity in assessing risk of death. In the 2013 audit of acute medical units 31% of patients had significant frailty (Le Jeune et al, 2013). Frailty is more common with age but is an age-independent risk factor and should be considered while determining the objectives of treatment or limitations to escalation plans. The Society for Acute Medicine's Benchmarking Audit '13 showed that patient admitted to acute medical units who are frail were often sicker, but that sicker patients were seen earlier than those who were not, independent of their frailty (Subbe et al, 2015).

Mitigation of risk

The Acute Medicine Task Force (Royal College of Physicians, 2007) recommended that the standardized National Early Warning Score (NEWS) should be integral to the assessment of illness severity and the trigger for prioritization of review and intervention throughout the acute care pathway.

Failure to rescue might be reduced in units with rapid response or critical care outreach teams who respond to worsening scores. By standardizing the response to abnormal physiology as mirrored by abnormal early warning scores the number of cardiac arrests is decreased and there are positive effects on hospital mortality and serious adverse events at least in some studies (Priestley et al, 2004). Electronic alert systems for abnormal renal function or abnormal vital signs can further reduce the number of critical incidents (Bellomo et al, 2012). An explicit monitoring plan that specifies which parameters should be measured how often with what response might mitigate some of this risk (National Institute for Health and Care Excellence, 2007).

With timely intervention the majority of unwell patients will improve (Subbe et al, 2001). For those who do not improve early liaison with critical care specialists should be the rule rather than the exception. The level of care required should determine the rate at which patients progress along the emergency pathway. Unstable patients should not be transferred out of the acute medical unit until they have been stabilized. There is a growing body of evidence, predominantly from areas outside of internal medicine, that the use of care bundles and checklists can improve reliability of safety-critical steps in high-pressure environments (Arriaga et al, 2013).

Organizational/structural factors

While there are patients who are at more risk than others, characteristics of organizations and processes also carry risk.

Risk through loss of information during handover between teams

The first part of this article suggests that the bulk of risk is documented in medical and nursing records. Information containing descriptions of risk is held by a number of health-care professionals who might or might not work on the same team. Most acute medical unit staff are shift workers and a majority of the medical staff are doctors-in-training. In most hospitals, these doctors only work on the acute medical unit for a limited period of time. Additionally, as the specialty at the hub of the hospital, acute medicine receives input from a large number of medical or non-medical specialties.

The medical handover is an interchange of high quality patient-specific information, responsibility and accountability between shift–pattern health-care professionals (National Patient Safety Agency, 2004). It is ideally a multidisciplinary meeting at a designated time and location, involving administrative data, new and updated clinical information, tasks, illness and contingency planning (Vidyarthi et al, 2006).

Poor handover endangers patient safety (Cook et al, 2000) and seems to be the rule rather than the exception (Callen et al, 2011). Safety-critical information is often handed over with the tribal and mundane and the use of paper documentation in many hospitals does not allow generation of up-to-date job lists or prioritizing life-saving over administrative tasks.

In patients admitted to acute medical units there are often two or more handovers where information is exchanged. At every interchange, information is prone to be lost or distorted with the potential for disastrous consequences. Retention of information and prioritization of relevant items is therefore often unreliable.

Mitigation of risk: A standardized handover process reduces medical errors and preventable adverse effects (Starmer et al, 2013). The literature from high reliability industries such as airline and nuclear industries suggests that standardization is a central condition for reliability. This is the background of the push by the Royal College of Physicians to standardize handover formats. The Royal College of Physicians' (2011a) first ever Acute Care Toolkit has a focus on handover quoting that over a weekend 'only 2.5% of information from the first handover is retained at the final handover if there is no written record. If notes are taken, 85.5% of information is retained, but this rises to 99% when a standardized pro forma is used' (Bhabra et al, 2007).

There is an increasing number of software platforms available that support handover. There are some published data to support their use (Govier and Medcalf, 2012) and a strong logical argument to suggest that the recurrent failings of handover on paper with a high number of reported adverse events should be reason enough to switch to a more contemporary form of information transfer.

One other possible solution would be to empower patients by training them in understanding of their care (O'Leary et al, 2010).

Risk as a result of cognitive overloading

The number of tests and investigations is highest during the admission to hospital. Results arrive at different times, often reviewed by staff who did not take part in the initial patient encounter. Integration of data with history and findings creates a high cognitive load with inherent risks of missing safety-critical information and abnormalities in the barrage of normal or insignificant results (Workman et al, 2007). The Institute of Medicine and others have reported deteriorating performance in fatigued humans.

Risk transmitted from other departments

Unsafe patient transfers are one of the top reasons for incident reporting in hospitals. The NHS Litigation Authority (2012) has issued criteria guiding safe transfer. To meet this standard Hindmarsh and Lees (2012) designed a 'transfer check list' for all patients leaving the acute medical unit at Heartlands Hospital. Incident reporting relating to transfer decreased significantly. Acute medical units also depend on competent and timely diagnostic services and provision of bed capacity for patients requiring admission. Dysfunctional processes in these areas will increase risk to patients and clinicians in the acute medical unit. These include delay in reporting tests or missed review of requested investigations.

Risk based on staffing patterns

There are differences in risk (Freemantle et al, 2012) and outcomes (Sorita et al, 2014) for patients who are admitted on different days of the week. Contributing factors include the severity of the patient's illness, reduced or altered staffing and skill mix, impact of shift system and/or changed training system for junior doctors, reduced availability of diagnostics, less availability of senior staff to review cases and be readily available for escalation, and less awareness among staff of unit policies around treatment and escalation.

The Royal College of Physicians (2013) is concerned that the mounting evidence of sub-standard care to patients admitted out of hours is related to the difficulties in providing sufficient input to these patients and supervision of junior doctors from consultants. There is only limited literature on the impact of introduction of acute medical units on clinical outcomes. Conway and colleagues (2014) described a relative risk reduction of 60% for hospital mortality in a cohort of patients seen at St James' Hospital, Dublin with full severity adjustment.

It is worth noting that there is no literature comparing units with pure firm-based-take with those run by acute physicians. The reasons for this are clear from the Society for Acute Medicine's Benchmarking Audit audits: most units run hybrid models with 60% of patients seen by an acute physician and 40% by an on-call team (personal communication, Society for Acute Medicine's Benchmarking Audit, 2014). There is, however, some evidence of the impact of the level of experience of the treating physicians on mortality (Conway et al, 2014).

Mitigation of risk: In its Acute Care Toolkit the Royal College of Physicians recommends a shift to 7-day-working with input and supervision by consultant staff at least 12 hours every day. There is some additional evidence that higher consultant presence on weekends is associated with better outcomes (Bell et al, 2013).

Sullivan et al (2013) found that medical short stay patients fared worse for pain control, privacy, involvement and information than patients in other specialties but patient experience can be used to drive clinical effectiveness and patient safety.

Discussion

This review found significant risks for patients admitted to and staff working on the acute medical unit but unfortunately only weak evidence for many of the interventions, which were usually from single-centre before–after studies. They therefore often do not allow generalization of the learning to other centres without an intimate understanding of their processes and context. There is also a growing body of research into safety in anaesthesia, some of which might be adaptable for use in the acute medical unit.

It is possible that the addition of acute medical units into the patient pathway has added complexity and therefore risk, or that the introduction of acute medicine could have led to deskilling of emergency department physicians. The authors are not aware of any literature that has examined this in detail. Acute physicians are trained to deal with the bulk of scenarios for unscheduled admissions. They are probably better prepared for this than many of their subspecialized colleagues. However, in some cases direct referral to specialists might be more efficient.

It is also likely that the pressure to turnover patients as fast as possible adds additional risk by shifting priorities to process and flow rather than patient care. This principle might equally lead to disruption of learning cycles compared with a firm-based approach as patients will usually be diagnosed and started on a care pathway in the acute medical unit but then move to another location with another team, thus depriving doctors from seeing the outcomes of their intervention.

Francis (2013) and Keogh (2013) highlighted the link between organizational culture and patient safety. These are particularly difficult to maintain in an environment such as the acute medical unit where a large number of professional groups from specialties with distinct governance structures and loyalties interact.

Don Berwick's (2013) report emphasized that it is not individuals but systems, procedures, conditions, environment and constraints that the health-care system faces that lead to patient safety problems.

Sustainable improvement in handover processes is likely to be at the core of improving the overall safety of care. Stakeholders in education and training need to consider establishing handover priority as a cultural norm (Sujan et al, 2014). In order to acquire new knowledge and to improve the quality of care to patients the Royal College of Physicians (2004) report on 'Acute medicine making it work for patients' recommends that acute medicine needs to develop a stronger research base. Given the high amount of risk that acute medical units are trying to mitigate on a daily basis, this seems to be an urgent requirement. **BJHM**

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KEY POINTS

- Risk is defined by the patient population, the set-up of acute medical units and the skill set of the team.
- The National Early Warning Score quantifies the risk of dying within 24 hours on an acute admission.
- Failure to rescue describes the lack of response of a team to obvious deterioration of a patient.
- Problems with handover are at the heart of many adverse incidents. Robust handover of safety-critical information is key for the safe performance of the acute medical unit.
- Missing outstanding investigations and results of existing investigations are major sources of risk.