A Hospital-Wide System for Managing the Seriously Ill: A Model of Applied Health Systems Research

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“For it happens in this, as the physicians say it happens in hectic fever, that in the beginning of the malady it is easy to cure but difficult to detect, but in the course of time, not having been either detected or treated in the beginning, it becomes easy to detect but difficult to cure.” (Niccolo Machiavelli, The Prince)

Learning Points

• In-hospital cardiac arrests are often proceeded by a slow and potentially reversible deterioration in the patient’s condition
• The Medical Emergency Team (MET) is a hospital-wide concept aimed at early identification and management of the seriously ill patient using simple clinical criteria
• Ward-based outcome indicators should include measures of potential preventability such as deaths, cardiorespiratory arrest, and intensive care unit (ICU) admissions without prior referral to the MET
• Introduction of the MET concept requires a change in culture of the whole hospital
• The practice of intensive care medicine is about process rather than location

In 1982 at a large tertiary hospital, a 20 year old injured motor cyclist was admitted to a general ward after being resuscitated in the emergency department. He had a fractured pelvis and left femur. While traction was being applied later that evening he had a cardiac arrest and did not respond to cardiopulmonary resuscitation (CPR). The case was discussed the following day and postulated reasons for the sudden death included fat embolism, and the sudden rupture of an undiagnosed aortic dissection. In fact, the clinical charts clearly demonstrated he had slowly deteriorated in the general ward and simply bled to death. The pulse rate had risen, the blood pressure decreased, the respiratory rate increased and finally the level of consciousness had slowly decreased. Autopsy confirmed this.
Introduction

We have had many similar patients admitted from the general wards who had slowly deteriorated without adequate management. Interestingly the attending nursing staff usually charted the deterioration perfectly and often the nursing staff shared their concerns with junior medical staff. However, the system did not seem to respond rapidly enough to the seriously ill on general wards, nor was there sufficient expertise, skills or supervision when medical assistance eventually arrived. This is a saga extending over almost 20 years, of how the principles of health systems research were used to address this issue. It is a saga of the specialty of intensive care moving out of its four walls and realizing that outcome is determined as much by the level of care delivered before and after the ICU as it is by the interventions within the ICU.

Early Management of Ischemia

Shock is described as inadequate cellular perfusion. We usually measure the extent of shock in terms of hypotension and signs of overt ischemia to individual organs such as oliguria, decreased level of consciousness and poor peripheral perfusion. However, these are late signs and ischemia can also occur in the splanchnic beds [1], liver [2], and even the cerebral circulation [3], despite apparently normal vital signs. Early ischemia, even if it is seemingly minor, can lead to measurable cellular dysfunction [4]. More overt ischemia can, of course, predispose to organ dysfunction such as acute respiratory distress syndrome (ARDS) [5], as well as multiple organ failure (MOF) [6], resulting in severe complications and death.

A common model of ischemia occurs as a result of trauma. Ischemia can occur soon after the traumatic event and unless detected and managed rapidly, can result in MOF and death [7]. This has focused our attention on the importance of rapid resuscitation in the management of trauma. The organization of a system to optimize trauma management involves components such as initial stabilization, transport to a major trauma center, activation of a team with personnel trained in resuscitation, as well as rapid investigation and definitive treatment [8]. The organization of trauma management in order to rapidly correct ischemia and hypoxia has resulted in a significant reduction in preventable deaths [9].

Despite our knowledge about the dangers of even minor degrees of ischemia [6], and the beneficial impact of organized and early intervention in patients with severe trauma, there have been few other systematic attempts to organize early intervention for all at-risk patients. While not involved in specific systems, specialized sections of a hospital such as ICUs, high dependency units (HDUs), operating rooms (OR), and emergency departments, provide a 24 hour environment where at-risk patients are rapidly attended to. A combination of comprehensive monitoring and supervision by staff with expertise in the management of the seriously ill should guarantee early recognition and rapid correction of ischemia.