Training

The surgical high dependency unit: an educational resource for surgical trainees

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Background: Learning to recognise the seriously ill patient and developing the ability to manage them is a very important part of the education and training of surgeons. A general surgical senior house officer (SHO) spends 4 months on our surgically-led high dependency unit (HDU), as part of their basic surgical training programme.

Aim: To assess a surgical high dependency unit as an educational resource.

Methods: We interrogated our specifically designed database for a 5-year period (April 1997 to March 2002) to look at what a 4-month attachment offered SHOs in respect of: the number of patients treated; their modes of presentation; the specialty; the physiological and operative scores as determined by the POSSUM scoring system; and the interventions that occurred.

Discussion: We have demonstrated that a 4-month attachment to a surgical HDU provides a consistent and valuable clinical resource for teaching and learning in surgical education and training.

Key words: High dependency unit – Level 2 care – Training

The role of the high dependency unit (HDU) as the level of care between the ward and the intensive care unit (ICU) has been recognised as an important resource for step-down care from the ICU and as a safe environment for pre-operative optimisation and postoperative care of surgical patients.^{1,2} Several models of combining ICU and HDU facilities have been reported by the Audit Commission's report. This identified some units run by surgeons but probably underestimates the contact surgeons have with seriously ill patients and, therefore, the need to ensure education and training for surgeons in this area.

In 1999, the UK Department of Health published *Comprehensive Critical Care: A Review of Adult Critical Care Services in*

Table 1 Levels of patient care

Level 0	Normal ward care
Level 1	Normal ward care with input from critical care team
Level 2	Detailed observation/intervention and support for single failing system excluding advanced respiratory support
Level 3	Advanced respiratory support alone, or support for > 2 failing systems

*England.*³ This document has re-defined the levels of care for patients as shown in Table 1. The characteristics of such a service are: (i) there should be integration with a hospital-wide policy for critical care; (ii) networks ensuring common

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standards across hospitals with a geographically close relationship; (iii) workforce development ensuring appropriate staff recruitment; (iv) promotion of a data collection culture; and (v) the development of evidence-based practice. Its emphasis is mainly on the service needs rather than the educational needs of the facility. Traditionally, the specialty of anaesthesia has provided the majority of doctors who work in critical care. It is predicted that in the near future, with the European Working Time Directive and an expansion in the need for these facilities, anaesthesia will fall short of providing for this.

The Royal College of Surgeons of England has pioneered the now popular 'Care Of the Critically Ill Surgical Patient' (CCRISP) course. The MRCS examination includes questions on critical care and the intercollegiate examination in general surgery has a part of the examination devoted to it. The newly established Intercollegiate Board for Training in Intensive Care Medicine oversees the CCST in intensive care medicine. A CCST in critical care is possible for specialist registrars in anaesthesia, medicine, surgery or accident and emergency in addition to their specialty CCST by extended training. It is governed by a well-planned curriculum.

Essential to any programme of education and training are the educational opportunities a unit may offer. This paper describes the educational opportunities that are available on a surgically run HDU.

Methods

The unit

The HDU admits around 500 patients per year (range, 454–551 patients; mean, 505.6 patients) and has been in existence for more than 16 years. There is an extremely experienced nursing staff and an SHO in the general surgical basic surgery training (BST) programme spends 4 months working on the unit. There are seven beds and there is good liaison with the intensive care staff and a pro-active Critical Care Committee. There is a wide range of patients for both elective and emergency surgery. Only patients requiring pulmonary artery catheters, haemofiltration, and mechanical ventilation are admitted to the ICU which has five beds.

The database

Data on all cases admitted to the HDU are prospectively entered into a specifically designed database, which is regularly updated throughout the patient stay by recording interventions and outcomes. We retrospectively reviewed data collected over a 5-year period (from April 1997 to March 2002) to obtain information on: (i) the mode of

Table 2 Workload by speciality

	Median	IQR	Range
Colorectal	44	35–59	34–70
Upper GI/hepatobiliary	27	21–33	17–37
Vascular	36	30–38	16–44
Orthopaedics/trauma	7	4–13	0–21
Urology	9	7–14	2–17
Miscellaneous*	6	5–9	2–13
Non-surgical	25	22–30	10–39

*Includes plastic surgery, head and neck surgery, and gynaecology.

admission (elective or emergency); (ii) physiological scores (using the physiological and operative severity score for the enumeration of morbidity and mortality, POSSUM system);⁴ (iii) diagnoses; and (iv) key therapeutic interventions.

Results

Data are presented as the median number of cases (or interventions) per 4-month period, with inter-quartile ranges (IQR) and ranges. Over 5 years, 2528 patients were admitted to the HDU. The elective admissions per 4-month period was 75 (64–87; 50–106), and the emergency admissions 90 (77–114; 58–135). The workload subdivided by the speciality is summarised in Table 2. The median POSSUM physiology score for all patients was 19 (15–25; 12–57), and the median operative POSSUM score was 13 (10–18; 7–34) for those who underwent an operation. Of all admissions, 285 (11.3%) did not undergo a surgical procedure. Most patients underwent monitoring of the following variables: invasive central venous and arterial pressures; hourly fluid balance; arterial haemoglobin oxygen saturation; cardiac electrical activity; and heart and respiratory rates. Further interventions are recorded in Table 3.

Table 3 Interventions managed on the HDU

	Median	IQR	Range
Anticoagulation	8	5–9	1–15
Inotropic support	8	4–11	2–21
Neuro-observation	6	3–10	2–17
Chest drain	2	1–5	0–11
Tracheostomy	3	2–5	1–8
CPAP/BIPAP	7	4–12	0–18
TPN	11	8–14	5–27
PCA	36	31–43	22–54
PCE	73	68–82	33–106
Thrombolysis	1	0–2	0–6

CPAP, continuous positive pressure ventilation; BIPAP, biphasic positive airway pressure ventilation; TPN, total parenteral nutrition; PCA, patient-controlled intravenous analgesia; PCE, patient-controlled epidural analgesia.

Discussion

The HDU team led by general surgeons admits and manages the sickest surgical patients in the hospital. More than 50% of these patients arrive as in the hospital as emergency admissions. The centralisation of these patients on this unit with a highly experienced and motivated nursing staff facilitates their care. High POSSUM physiology scores (half the patients have a score above 19) reflect their co-morbidity. The high operative POSSUM scores indicate the complexity of operative intervention necessary to treat them. Safe management of these patients requires a depth of knowledge of surgical pathology, an ability to assess sick patients and to effect appropriate clinical care, with meticulous attention to detail in an appropriately paced episode of care. Good communication skills are important; not only to co-ordinate the multidisciplinary team, but also to ensure that communication with the patient and their relatives is empathetic and appropriate.

A 4-month attachment to surgical HDU offers an excellent educational opportunity to SHOs in surgical training both in consistent numbers of cases and complexity of surgical disease. As part of the HDU team, an SHO will not only learn about the management of acute surgical illness but will also improve their understanding of the complexity of communication skills necessary to do this well. The side-by-side practice of doctors in training and senior nurses facilitates all the important exchange of knowledge and practice necessary to develop those working in critical care.

At present, the structure of a year-long surgical rotation offered at our hospital allows for a 4-month attachment to the HDU; however, we acknowledge that this form may provide logistical problems in other institutions where attachments are provided in 'traditional' 6-month blocks. In recent years, there has been a change in how critical care is delivered. It has been recognised that the admission of a sizeable proportion of patients treated in critical care facilities could have been avoided. McQuillan *et al.*⁵ showed that in more than half of the patients, before their admission to the ICU (level 3 care), there was sub-optimal management. The development of critical care outreach teams has been advocated,^{4,6} the purpose of which are not only to avert

admissions to higher levels of care but to also facilitate discharge from these areas.⁴ The inclusion of surgical trainees (attached to level 2 areas) on outreach teams, if they were available in the hospitals, would therefore not only be appropriate but also increase the educational opportunity of such a rotation.

The surgical HDU offers to the teachers of SHOs in surgery a wealth of clinical practice for the purpose of education and training. The technical skills involved in the process may be taught and developed in the clinical setting. Good assessment will ensure that the right techniques are learned.

Conclusions

The surgical HDU provides the 'bread and butter' of learning opportunities for surgical SHOs. It will also provide an opportunity for young surgeons to consider further sub-specialisation in this important and demanding area. On this basis, we suggest that formal critical care training for surgeons should be included in the surgical curriculum and that surgeons consider the possibility of a CCST in critical care. More specialised HDUs in hospitals providing technically demanding surgery (cardiothoracic, transplant, *etc.*) may provide additional/alternative critical care training for those following specific career paths.

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