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MAIN ARTICLE

Airway and head and neck high dependency unit: a single-centre experience

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Abstract

Objective: Dedicated otolaryngology high dependency units are uncommon. This paper reports the first experiences of such a facility in the UK, assessing reason for admission, duration of stay, occupancy rate and need for care escalation. The study sought to assess the presence of similar units in the UK.

Methods: A retrospective review of high dependency unit admissions over an 18-month period and a national survey of otolaryngology departments in the UK were conducted to establish the overall presence and location of similar high dependency units.

Results: A total of 128 patients were admitted during the study period, mainly following surgery and because of airway compromise. The average duration of stay was 2–3 days (range, 1–12 days). The occupancy rate was 31.7 per cent. No patients required their care to be escalated to the intensive care unit. Seven similar high dependency units were identified in the UK.

Conclusion: The care provided prevented the need for escalation of care to an intensive care unit. This challenges the need for patient management on intensive care units following major surgery or airway compromise for those not requiring assisted ventilation. High dependency units similar to ours are not widespread.

Key words: Wounds And Injuries; Tracheostomy; Perioperative Care; Reconstructive Surgical Procedures; Oral Surgical Procedures; Laryngectomy; Neck Dissection

Introduction

Dedicated surgical high dependency units have been established in the UK for 20 years.[1–3] Their facilities provide vulnerable patients with more nursing care than would be available on a general ward. The units offer access both to staff who are experienced in specific aspects of their care and to dedicated surgical teams; in addition, there is access to intensive care support, provided on request. Specialty-specific high dependency units have been developed for general surgery, neurosurgery and cardiac surgery; these provide safe post-operative care immediately after surgery or following intensive care admission.[4–7] Their numbers and use have increased in both tertiary centres and district general hospitals.[8] The use of dedicated high dependency units in otolaryngology is rare compared to other surgical specialties.

The high dependency unit in our shared otolaryngology and oral and maxillofacial ward was founded in the late 1990s following a patient fatality post-surgery due to airway obstruction whilst the patient was being cared for on our general ward. The unit aims to provide a facility for the close observation and care of patients with compromised airways during infection, trauma and following surgery. The unit also provides general post-operative care to patients, usually following major head and neck surgery.

The high dependency unit has two beds, each equipped with piped oxygen and suction, with continuous monitoring. Electronically controlled infusion pumps can also be used (Figure 1). The unit is staffed by qualified nurses on a 2:1 or 1:1 nurse-to-patient basis, depending on the occupancy of the unit. This ratio is the same as other high dependency units. If the unit cannot be opened because of staffing shortages then patients are either cared for on other high dependency units in our hospital or they receive special care on the general otolaryngology ward. Medical care is provided by the ward teams, but anaesthetic care is available on request from the hospital's intensive care unit. When there is no demand for the unit to be opened, nursing staff are deployed on the general otolaryngology and oral and maxillofacial ward.

This paper reports the first experiences of a dedicated otolaryngology high dependency unit facility in the UK. In addition, a national survey of otolaryngology departments was performed to identify if units similar to our own have been established elsewhere in the UK and to assess for any pattern in their location.

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FIG. 1
High dependency unit.

Materials and methods

We retrospectively assessed the high dependency unit admission books on our ward for an 18-month period, between November 2012 and April 2014. The number of admissions, reason for admission, duration of stay in the high dependency unit and high dependency unit occupancy rate were recorded. The ratios of patients whose care was escalated or de-escalated following admission to the high dependency unit were also examined to establish the effectiveness of the care provided by the unit. The financial costs of high dependency unit admission compared to intensive care unit admission were analysed to assess if any monetary benefits were gained by the presence of the high dependency unit.

A national telephone survey was conducted asking all otolaryngology departments in the UK if they operated a high dependency unit or similar facility for the care of airway emergencies and/or post-operative patients, particularly following elective and emergency head and neck surgery.

Results

Over an 18-month period, 128 patients were admitted to the high dependency unit. Sixty-six patients were admitted directly following surgery. Twenty-eight patients were admitted for airway observation and care. Other reasons for admission included care following traumatic injury, non-surgical emergencies and observation during aspirin desensitisation as part of our local programme to treat patients with Samter's triad (Table I).

The average duration of stay was 2–3 days (range, 1–12 days). The occupancy rate of the high dependency unit was 342 bed days (31.7 per cent). From a review of patient records, we could not identify any patients who required their care to be escalated from the ward's high dependency unit to the hospital's intensive care unit.

The cost of an overnight admission on the high dependency unit is approximately £900. The cost of an admission to our general ward is approximately £600. In contrast, the cost of an overnight admission to our hospital's intensive care unit is approximately £2000.

TABLE I
HIGH DEPENDENCY UNIT ADMISSIONS

Reason for admission	Patients (*n*)
Surgery for malignant disease	
– Mandible excision + neck dissection ± free flap	4
– Cheek excision + neck dissection + local flap	2
– Hemiglossectomy + neck dissection ± free flap	3
– Oropharyngectomy ± neck dissection + radial forearm free flap	2
– Total glossectomy + bilateral neck dissection	2
– Lip tumour excision + neck dissection ± local flap	2
– Laryngectomy ± neck dissection	5
– Radical neck dissection	2
– Pectoralis major pedicled flap	2
– Microlaryngoscopy ± laser	2
– Iliac crest graft	1
– Unspecified resection	1
– Parotidectomy + neck dissection	1
– Floor of mouth excision + neck dissection + radial forearm free flap	1
– Laryngeal tumour debulking	1
– Pectoralis major pedicled flap salvage	1
– Unspecified resection + radial forearm free flap	1
Surgery for benign disease	
– Bimaxillary osteotomy	22
– Bilateral sagittal split osteotomy	5
– Genioplasty	5
– Tracheostomy	3
– Le Forte osteotomy	2
– Sagittal split osteotomy	1
– Tracheostomy stoma closure	1
– TMJ arthrocentesis	1
– Le Forte 2 osteotomy	1
– Bicoronal flap & plate removal	1
– TMJ arthroplasty	1
– Septoplasty	1
– Dental extraction	1
– Open rhinoplasty	1
– Nasal polypectomy	1
– Oesophageal dilatation	1
Airway care	
– Stridor	8
– Epiglottitis	2
– Tonsillitis with airway obstruction	1
– Laryngeal stricture	1
– Unspecified airway obstruction	1
Miscellaneous	
– Aspirin desensitisation observation	10
– Facial cellulitis	2
– Haemorrhage following dental extraction	1
– Support during radiotherapy	1
– Epistaxis	1
– Pneumonia	1
– Cardiac arrest	1
– Sublingual abscess drainage	1
– Post-operative chest pain	1
– Peri-tonsillar abscess	1
Trauma	
– Mandible fracture	5
– Laryngeal fracture	2
– Mid-facial fracture	1
– Zygoma fracture	1
– Orbit fracture	1
– Neck laceration	1
– Angioedema	1
– Foreign body	1
– Vocal fold palsy	1

TMJ = temporomandibular joint

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The total cost of opening and using the ward's high dependency unit over the 18-month period was £307 800.

The authors believe that 54 patients who were cared for in the high dependency unit, for a total of 194 days, would have required their treatment to be provided on the hospital's intensive care unit because of the nature of their pathology if the high dependency unit did not exist. The approximate cost of this would have been £388 000. Accounting for this, the high dependency unit provided a cost saving of £80 200 during the study period. The high dependency unit would have cost £133 200 to open and staff during the study period when discounting those patients who would otherwise have had to be managed on the intensive care unit.

All otolaryngology departments in the UK were contacted in our telephone survey and all responded to our enquiries. Seven other departments were identified as operating a high dependency unit facility; these catered for patients with elective and emergency airway conditions, and head and neck conditions, and those who had recently undergone airway or head and neck surgery. All are major tertiary centres in large UK cities. There was otherwise no pattern to their location.

Discussion

Whilst the use of surgical high dependency unit facilities is now well established in the UK, their use in otolaryngology and head and neck surgery is quite sparse. Surgical high dependency units have principally been developed to provide post-operative care to patients following major or emergency surgery. In this regard, our high dependency unit is similar to other surgical high dependency unit facilities in our hospital and other centres. Whilst the reason for the development of our high dependency unit was to facilitate monitoring and early treatment for airway compromise (e.g. following trauma or infection where rapid deterioration is possible), the commonest reason for admission to our unit is for post-operative care, usually after major head and neck oncological surgery. This group of patients have far greater care demands than patients undergoing elective day-case surgery or those who are younger and fitter and admitted for care for less severe emergency conditions. These patients usually require surgical airway care, wound care, surgical drain care, support with feeding, analgesia and management of any co-morbidities (e.g. ischaemic heart disease, chronic obstructive pulmonary disease and renal failure) that may have been exacerbated by prolonged general anaesthesia. Indeed, another reason for admission included the monitoring of patients following surgery or those who presented with less extreme otolaryngological emergencies but whose poor medical condition required closer observation than could be provided on a general ward.

The occupancy rate of just 31.7 per cent reflects the smaller, specialist nature of otolaryngology and oral-maxillofacial surgery, as well as the patient volume in our region (approximately 540 000). There were no delays in discharge from the high dependency unit to the ward because of lack of bed space or nursing staff to provide care. The establishment of the high dependency unit reduces bed pressures on the hospital intensive care unit, particularly during periods of high demand (e.g. seasonal disease outbreaks). The facility also prevents cancellations of major operative cases through lack of suitable post-operative care facilities. In addition, it prevents delays in commencing major head and neck surgery associated with waiting for intensive care unit bed space to become available. This prevents operations taking place late into the day and overnight, and the cancellation of clinical activities the following day.

It can be difficult to determine the costs incurred and savings provided from establishing such high dependency unit facilities. Little additional training needs to be provided for the high dependency unit nursing staff. These individuals provide regular ward care for patients admitted to the high dependency unit, but at a lower ratio of 2:1 rather than 6:1. This higher level of nursing care accounts for the greater cost of an overnight admission to the high dependency unit compared to the general ward.

The safe care provided within our dedicated high dependency unit calls into question the need to manage patients on intensive care units following head and neck cancer surgery with reconstruction or those with airway compromise who do not require assisted ventilation. Marsh *et al*. reported that 46 per cent of maxillofacial units in the UK provided early post-operative care for free flap cases outside of an intensive care unit environment.[9] Teams in the UK and India have previously reported that safe post-operative care can be provided following major head and neck surgery in ward and general high dependency unit environments respectively.[10,11] This offers reassurance that cost-effective care can be provided to patients in whom post-operative complications often occur.[12] Such units also provide useful training opportunities for medical and nursing staff.[7,13]

Our head and neck high dependency unit offers a useful facility for increased patient care. It also provides easy access to the specialist otolaryngology and oral-maxillofacial teams, which give day-to-day support and care. Patients in the hospital with a surgical airway can also be cared for, and this has been a growing part of the service provided by the high dependency unit facility. The limited need for care escalation to the intensive care unit from the high dependency unit demonstrates that such a unit is a safe environment to deliver care to patients with a variety of airway and post-operative issues. The crucial aspects of such a unit's success are the training provided both to nursing and medical staff, their experience, and supervision by consultant surgeons.

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- **A dedicated high dependency unit provides additional benefits for monitoring and treating patients with airway compromise or a surgical airway**
- **Such a unit can offer specialised care following elective and emergency major head and neck surgery**
- **The development of such a unit requires limited additional training and equipment resources**
- **The high dependency units can reduce patient admissions to costlier intensive care units**
- **The units provide a safe environment for care of patients with additional medical problems, and a useful training environment for medical and nursing staff**

Other otolaryngology departments need to consider if the establishment of such a high dependency unit facility is financially viable. This may be less likely in smaller units or in units with lower volumes of head and neck oncological resection cases. This may be reflected in the city locations of high dependency unit facilities similar to our own, where demand for aftercare following head and neck cancer ablation with or without microvascular reconstruction is greater. A dedicated airway and head and neck high dependency unit may be more suitable in large tertiary centres or those centres where large volumes of major head and neck surgery occur.

References

1 Crosby DL, Rees GA. Post operative care: the role of the high dependency unit. *Ann R Coll Surg Engl* 1983;**65**:391–3
2 Houghton PW, Donaldson LA, Crumplin MK. The role of the intensive care unit in a district hospital. *Ann R Coll Surg Engl* 1984;**66**:46–8
3 Nehra D, Crumplin MK, Valijan A, Edwards AE. Evolving role of intensive and high-dependency care. *Ann R Coll Surg Engl* 1994;**76**:9–13
4 Batra GS, Molyneux J, Scott NA. Colorectal patients and cardiac arrhythmias detected on the surgical high dependency unit. *Ann R Coll Surg Engl* 2001;**83**:174–6
5 Robertson SA, Skipworth RJ, Clarke DL, Crofts TJ, Lee A, De Beaux AC *et al*. Ventilatory and intensive care requirements following oesophageal resection. *Ann R Coll Surg Engl* 2006;**88**:354–7
6 Chong JL, Pillai R, Fisher A, Grebenik C, Sinclair M, Westaby S. Cardiac surgery: moving away from intensive care. *Br Heart J* 1992;**68**:430–3
7 Ghosh S, Steyn RS, Marzouk JF, Collins FJ, Rajesh PB. The effectiveness of high dependency unit in the management of high risk thoracic surgical cases. *Eur J Cardiothorac Surg* 2004;**25**:123–6
8 Thompson FJ, Singer M. High dependency units in the UK: variable size, variable character, few in number. *Postgrad Med J* 1995;**71**:217–21
9 Marsh M, Elliott S, Anand R, Brennan PA. Early postoperative care for free flap head & neck reconstructive surgery--a national survey of practice. *Br J Oral Maxillofac Surg* 2009;**47**:182–5
10 Godden DR, Patel M, Baldwin A, Woodwards RT. Need for intensive care after operations for head and neck cancer surgery. *Br J Oral Maxillofac Surg* 1999;**37**:502–5
11 Mathew SA, Senthilnathan P, Narayanan V. Management of post-operative maxillofacial oncology patients without the routine use of an intensive care unit. *J Maxillofac Oral Surg* 2010;**9**:329–33
12 Harréus U. Surgical errors and risks - the head and neck cancer patient. *GMS Curr Top Otorhinolaryngol Head Neck Surg* 2013;**12**:Doc04
13 Ghosh S, Torella F, de Cossart L. The surgical high dependency unit: an educational resource for surgical trainees. *Ann R Coll Surg Engl* 2004;**86**:44–6

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