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# The role of the high dependency unit in postoperative care: an update

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**The current experience of a high dependency unit established 5 years ago for the postoperative care of high-risk patients undergoing surgery is reported. The resource implications and contributions to the safety and quality of postoperative care, particularly pain relief, are described.**

The University Hospital of Wales has approximately 840 acute beds, 365 of which are allocated to various surgical specialties, including neuro- and cardiac surgery. The Intensive Therapy Unit (ITU) has 10 beds, as well as six beds for coronary care.

The development of a High Dependency Unit (HDU) for the postoperative care of high-risk patients undergoing surgery at the hospital has been reported previously *(1)*. During the last 5 years the unit has become firmly established and we report here its current status, operational policy, clinical activity and resource implications.

## The unit

The unit has seven beds in an area previously designated as a general ward seven-bed area (13.2 m × 6.15 m) (Fig. 1) and is sited adjacent to the hospital's ITU and emergency surgical admission ward. Each bed has piped suction and oxygen and monitoring equipment which includes pulse oximetry, ECG and body temperature. Electronically controlled infusion pumps are available for each patient (Fig. 2). The nursing establishment of 16 full-time equivalents, all qualified nurses, normally allows a ratio of approximately one nurse to two patients. For the unit as a whole, this means a ratio of 2.3 nurses for each bed in the HDU, compared to 0.3 and 6.2 for the general surgical wards and ITU, respectively (Tables I and II). Night duties are undertaken by internal rotation. The unit does not provide facilities for ventilatory support, which are only available in the ITU. Also, facilities have not been provided for paediatric patients.

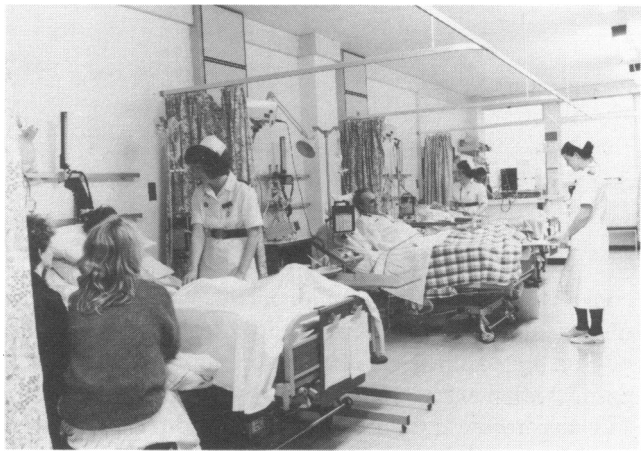

*Figure 1.* A general view of the High Dependency Unit.

The overall costs of nursing, treatment, and diagnostic services are approximately £90/day for each bed in the HDU. The equivalent costs for general surgical ward beds and ITU beds are approximately £40 and £262, respectively (Table III).

## Operational policy

The detailed clinical care of each patient admitted to the HDU remains the direct responsibility of the referring

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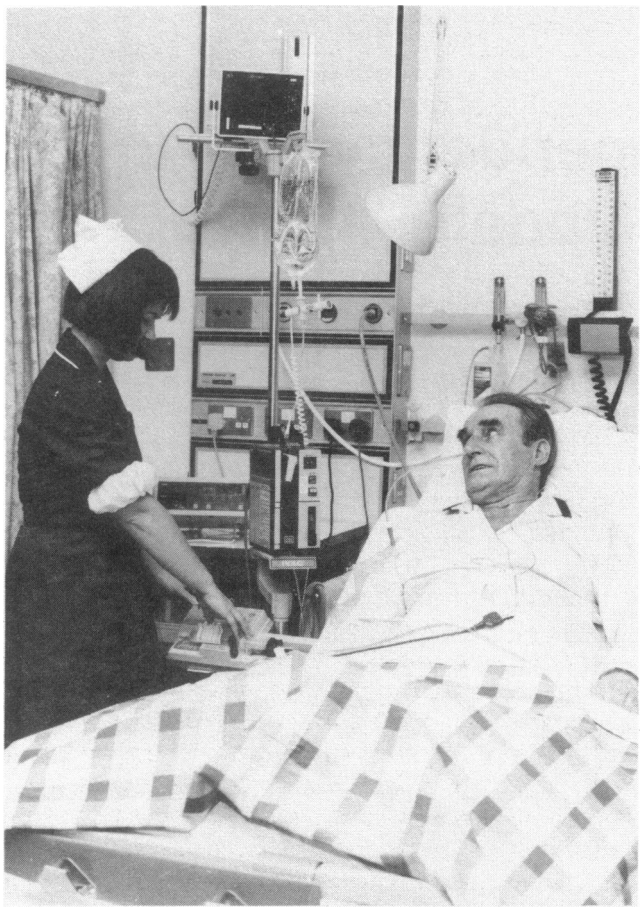

*Figure 2.* An infusion pump alongside a patient.

consultant and relevant junior medical staff. Admission of patients is normally arranged either electively on the day before planned surgery, or on an emergency basis. Some patients are transferred between the HDU and ITU according to their clinical state and particularly the need for ventilatory support. Discharge of patients from the HDU to general wards is arranged after consultation between the relevant medical and nursing staff.

## Patients

Between 1 April 1988 and 30 March 1989 611 patients were admitted to the unit. Of these, 43.5% had undergone major vascular or gastrointestinal surgery and 87% of all patients were admitted directly from the operating theatre (Table IV and Table V). Of patients admitted to the unit, 93.5% were subsequently returned to their original surgical wards and less than 5% needed transfer to the intensive therapy unit, usually because of the need of ventilatory support (Table VI). The age of patients admitted ranged from 10 years to over 90 years; 85% were over 50 years old, and 40% were over 70 years old (Table VII). The great majority of patients (87.9%) remained in the unit for less than 3 days (Table VIII). The number of admissions cancelled when major surgery proved inappropriate or inoperable was 68.

The mortality rate of patients admitted to the HDU was 1.9%. In accordance with hospital policy, all deaths and major complications have been subjected to peer review and clinical audit. In 20% of patients, pain relief was provided by the continuous administration of epidural narcotics during their stay in the unit.

*Table I.* University Hospital of Wales 1989, nurse:bed ratio

| *Area* | *Surg. ward* | *HDU* | *ITU* |
|---|---|---|---|
| Beds (B) | 32 | 7 | 10 |
| Nurses (N) | 11 | 16 | 62 |
| Ratio N/B | 0.3 | 2.3 | 6.2 |

*Table II.* University Hospital of Wales 1989, nursing establishment

| *Area* | *Surg. ward* | *HDU* | *ITU* |
|---|---|---|---|
| Beds | 32 | 7 | 10 |
| Sisters | 1 | 1 | 9 |
| Staff nurses | 7 | 12 | 29 |
| SENs | 3 | 3 | 24 |

*Table III.* University Hospital of Wales 1989, Costs per bed per day*

| *Area* | *Beds* | £ |
|---|---|---|
| ITU | 10 | 262 |
| HDU | 7 | 91 |
| Ward | 32 | 40 |

* Nursing, treatment and diagnostic services

## Discussion

High dependency units are an integral component of progressive patient care which have received far less attention in the medical literature than the contributions

*Table IV.* High dependency unit: Admissions 1 April 1988 to 30 March 1989

| | *Numbers* | % |
|---|---|---|
| Vascular | 176 | 28.8 |
| Gastrointestinal | 90 | 14.7 |
| Colorectal | 130 | 21.3 |
| Hepatobiliary | 83 | 13.6 |
| Orthopaedic | 24 | 3.9 |
| Gynaecology | 26 | 4.3 |
| Medical | 27 | 4.4 |
| Others | 55 | 9.0 |
| Total | 611 | 100.0 |

*Table V.* High dependency unit: Source of admissions 1 April 1988 to 30 March 1989

| | *Numbers* | % |
|---|---|---|
| Operating theatre | 533 | 87.2 |
| Wards | 40 | 6.6 |
| Intensive therapy unit | 38 | 6.2 |
| Total | 611 | 100.0 |

*Table VI.* High dependency unit: Discharges 1 April 1988 to 30 March 1989

| | *Numbers* | % |
|---|---|---|
| Intensive therapy unit | 27 | 4.4 |
| Wards | 571 | 93.5 |
| Death | 12 | 1.9 |
| Home | 1 | 0.2 |
| Total | 611 | 100.0 |

made by ITUs. A scrutiny of the Index Medicus for the last 6 years yielded only six articles pertaining to progressive patient care, whereas in any one year there were at least 200 in regard to ITUs *(2)*. Nevertheless, we believe that the potential contribution that HDUs can make to the postoperative care of large numbers of patients is very considerable and, in our view, all hospitals providing for the care of high-risk patients undergoing surgery should be so equipped.

As with ITUs, it is difficult to measure in statistical terms by either mortality or morbidity rates the benefits *(3,4)* to patient care that can be ascribed to HDUs. Nevertheless, there is a general conviction among our colleagues concerning the positive contribution the unit makes to the safety and quality of care for high-risk patients. This is particularly so when staffing levels on general wards have been variable.

The selection of patients most likely to benefit from admission to the HDU has evolved with little difficulty and the detailed scoring system which we initially employed *(1)* has now proved largely unnecessary. Admission criteria relate mainly to the risks of the operation being performed, the severity of the patient's illness, and the need for close postoperative observation. Obviously, patients of advanced age undergoing major

*Table VII.* High dependency unit: Age of patients 1 April 1988 to 30 March 1989

| *Age (years)* | *Numbers* | % |
|---|---|---|
| 10–30 | 25 | 4.1 |
| 31–50 | 55 | 9.0 |
| 51–70 | 281 | 46.0 |
| 71–90 | 242 | 39.6 |
| 91+ | 8 | 1.3 |
| Total | 611 | 100.0 |

*Table VIII.* High dependency unit: Length of stay 1 April 1988 to 30 March 1989

| | *Numbers* | % |
|---|---|---|
| 1–3 days | 537 | 87.9 |
| 4–7 days | 66 | 10.8 |
| 8+ days | 8 | 1.3 |
| Total | 611 | 100.0 |

surgery commonly pose this combination of circumstances. The diversity of surgical specialists and anaesthetists using the unit, together with their relevant junior staff, poses additional demands on the nursing staff. However, recruitment has not been a particular problem. Nurses on main surgical wards have generally welcomed the segregation of high dependency patients in this way, particularly at night. Also, patients frequently express their satisfaction at the close clinical observation they receive during a critical phase of their care.

In regard to postoperative pain relief, the HDU is an area where more sophisticated techniques such as patient controlled analgesia, continuous intravenous opiates, and the use of epidural narcotic analgesia can be safely applied. This is particularly important since the latter technique is sometimes associated with late respiratory depression *(5,6)*, which makes its use on general wards potentially hazardous and therefore inappropriate *(7,8)*. Also, since there is now evidence that these techniques may contribute to improved outcome in high-risk patients *(9,10)* it is important that acute hospitals develop such units where these potential advances can be applied and assessed *(11)*.

We are aware that in purely financial terms HDU beds cost significantly more than general ward beds with regard to nursing, treatment and diagnostic services. However, they cost much less than ITU beds, which have to be used for similar patients in those hospitals which do not possess HDUs *(12)*. We wish to stress that we see high dependency care essentially as a staging post within a progressive patient care system which is necessary for those patients who do not need the comprehensive services of an ITU but who do need more care and observation than is currently available on general wards. Consequently, we believe such units to be a cost-effective way of using available resources to best advantage in providing better patient care.

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