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Pattern of admissions to the University of Port Harcourt Teaching Hospital intensive care unit – a 10-year analysis

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Objective. To determine the admission pattern and outcome of patients in the Intensive Care Unit (ICU) of University of Port Harcourt Teaching Hospital (UPTH), Port Harcourt, Nigeria.

Method. A retrospective review of all patients admitted to the ICU at the UPTH from 1996 to 2005 was carried out. Data were obtained from the ICU admission and discharge registers and nurses' handover records.

Results. A total of 1 447 patients were admitted from 15 departments. There were 658 males and 789 females (male/female ratio 1:1.2). Ages ranged from 4 months to 90 years, the median age was 30 years and the mean age was 31.7±5.6 years. The highest proportion of admissions (48.7%) was from the Department of Obstetrics and Gynaecology, and the lowest from Ophthalmology and Anaesthesia (0.1%). Postoperative cases made up 62.1% of total admissions, with post-caesarean section (CS) contributing 65.7% of these. Non-availability of beds in the ward was the reason for the majority of the post-CS admissions. Up to 41.5% of the patients admitted to the ICU had no justifiable reason for admission. Average length of stay was 8.1±2.8 days, median 4.5 days. One patient was manually ventilated for 5 hours, none was mechanically ventilated, and none had invasive cardiac monitoring. Three children had peritoneal dialysis for acute renal failure. Unconscious patients were fed enterally through a nasogastric tube, while conscious patients ate orally. Analysis of outcomes showed that 597 patients (41.3%) were transferred to the wards, while 352 (24.3%) were discharged home. The outcome was not indicated in 128 cases (8.8%), 16 patients (1.1%) left the ICU against medical advice, 1 patient (0.1%) was referred to another tertiary institution and 1 (0.1%) absconded. Three hundred and fifty-two patients died, giving a mortality rate of 24.3%.

Conclusion. The highest percentage of admissions to the ICU was from the Department of Obstetrics and Gynaecology. The majority of the patients did not require intensive care but were admitted because there was no bed in the wards.

Caring for the critically ill is a challenge in developing countries, where health needs often outstrip available resources.[1,2] Necessary equipment is scarce and often malfunctions,[3,4] and trained manpower is limited.[4] Intensive care in such settings is reduced to high-dependency nursing care,[1] yet the patients are critically ill, need intensive care, and so cannot to be turned away from the hospitals.

Intensive care units (ICUs) in most of the developed world are high-technology facilities with the most advanced medical technology, electronic monitoring, mechanical ventilation and other life-support measures, as well as up-to-date drugs and highly trained and skilled personnel. In the tropics, however, various levels of care for the critically ill have been described,[2] and intensive care in the developing world has been defined as doing the best for the critically ill with the resources available.[1,2]

Admission patterns and outcome in some ICUs in developing countries have been described previously,[3-7]

and all reports show evidence of the need for improvement in funding, manpower, training and equipment.

The University of Port Harcourt Teaching Hospital ICU

University of Port Harcourt Teaching Hospital (UPTH) is an accredited training centre for many medical and surgical specialties including anaesthesia. It is the only tertiary health facility with an ICU serving Port Harcourt in Rivers State, Nigeria, with a population of about 5 million people (and the adjoining states of Bayelsa and Abia with a total population of about 4.5 million people).[8]

The ICU of the 500-bed UPTH was established at the temporary site of the hospital in 1996 in a converted and renovated medical ward. There were 8 beds, demarcated into male and female sections with 4 beds each, with half-glass partitions in an open ward. There were no single-bed cubicles for isolation and no clearly defined reception area – patients and relatives were received just inside the entrance beside the nurses' station.

As in other hospitals in Nigeria, the ICU is a unit in the Department of Anaesthesia[3,5,6] and is headed by a consultant anaesthetist with an interest in critical care but no specialist training (there is no anaesthesia subspecialty training in Nigeria). There is no full-time doctor in the ICU, and anaesthesia residents provide 24-hour coverage on an on-call basis. Patients are managed jointly by the primary physicians, with the Department of Anaesthesia providing acute care through the team on call.

During the period under review only level 1 care as described by Watters *et al*.[2] (basic monitoring of pulse, blood pressure, respiration, temperature, level of consciousness and urine output; regular turning of patient, nasogastric feeding and suctioning of intubated patients) could be provided in this ICU. There were no facilities for mechanical ventilation in the hospital and no invasive cardiac monitoring. Non-invasive multiparameter/electronic monitors were not available except for a short period in 2005 when two portable electronic monitors for blood pressure, heart rate and SpO_2 were acquired (they later malfunctioned and could not be repaired); other than that all monitoring was carried out manually.

Oxygen was provided through pin-index cylinders on an old Boyle's anaesthetic machine, bull nose cylinders and one oxygen concentrator that could not be used when there was a power outage as the ICU had no electrical back-up. Electric and manual suction machines were available, but there were no infusion pumps or syringe drivers. Adrenaline was the only inotrope available and was administered through a regular infusion line and titrated by counting drops, as was done when administering total intravenous anaesthesia in our centre.[9]

There were no written protocols in the ICU, but guidelines on admission were available. No patient was to be admitted to the ICU without the consent of the anaesthetic team on call. As far as possible, patients with a very poor prognosis were not to be admitted to the ICU, but there were no scoring systems in use other than the Glasgow Coma Scale (GCS). Patients were admitted purely on the basis of clinical assessment. There was no side laboratory or facilities for arterial blood gas analysis, and laboratory back-up was from the hospital laboratory services.

Admission guidelines were not always adhered to, as the ICU was the only ward in the hospital at that time that had air-conditioning and an average nurse/patient ratio of 1:4. (Some other wards in the hospital had a nurse/patient ratio of about 1:15, especially on the night shift.) For this reason sick relatives of medical staff and some important people from the community were admitted to the ICU on request because nursing care was better and the environment more comfortable, especially during the hot dry season.

Sometimes patients were admitted because no bed was available in the wards. They were discharged to the wards as soon as there was a bed, but sometimes this was not possible and patients were discharged home from the ICU. Sadly, on a few occasions during the period under review when all ICU beds were occupied, some patients who needed closer monitoring and intensive nursing care could not be admitted to the ICU.

Records of management were in the patients' hospital folders, but ICU records were kept in an admission/discharge register as well as a nurses' handover register. Hospital records were not computerised, and there was no computer in the ICU; all records were written by hand and kept by the nurses.

These facilities were more limited than those in other teaching hospitals in Nigeria, such as University College Hospital, Ibadan, Nigeria, where our residents in anaesthesia did a rotation in the ICU, and Jos University Teaching Hospital ICU, where our nurses did a year of their training.

This paper looks at the admission pattern in this open, multidisciplinary ICU in a teaching hospital in Port Harcourt, noting the challenges of caring for the critically ill without sophisticated equipment and the outcome of management.

Methods

A retrospective review of all patients admitted to the ICU at UPTH over a 10-year period (from January 1996

to December 2005) was undertaken. Data were obtained from the ICU admission and discharge registers, as well as the nurses' handover records. The admission and discharge registers recorded the patient's name, hospital number, sex and age, the date of admission, diagnosis on admission and date of discharge, and where the patient was discharged to. Data in the nurses' handover records reported patient management during each of the nurses' shifts (there were three shifts – morning, evening and night). Data obtained included the patient's age and sex, the medical/surgical specialties requesting patient admission, the diagnosis on admission, reason for admission and average length of stay (LOS), interventions if any, and outcome. Results are presented as simple percentages.

Results

A total of 1 447 patients were admitted into the ICU from 15 departments in the hospital. There were 658 males and 789 females, giving a male/female ratio of 1:1.2. Ages ranged from 4 months to 90 years with a mean of 31.7±5.6 years and median of 30 years. The Department of Obstetrics and Gynaecology had the highest rate of admissions (48.7%), and Ophthalmology and Anaesthesia had the lowest (0.1%) (Table I). Eight hundred and ninety-nine postoperative cases accounted for 62.1% of total admissions. Five hundred and ninety-one post-caesarean section (CS) patients were admitted over the 10 years; they comprised 65.7% of postoperative admissions and 40.8% of total admissions. As shown in Table II, the majority of the CS patients were admitted to the ICU because there was no bed space in the postnatal ward.

Further analysis showed that a total of 601 patients (41.5%) did not actually require ICU admission (Fig. 1). All the patients from the neurosurgical unit, burns and plastic surgery, internal medicine, accident and emergency, paediatrics, orthopaedics, maxillofacial, cardiothoracic and anaesthesia had justifiable reasons for admission, but only 152 (21.6%) of 704 obstetrics and gynaecology patients and 198 (88%) of 225 general surgical patients should have been admitted (Fig. 2).

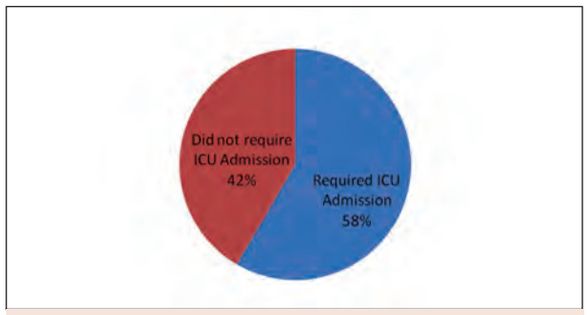

Fig. 1. Justifiable and non-justifiable admissions to ICU, as proportions of total admissions.

Table II. Indications for post-CS admissions

Indication	No. (%) (*N*=591)
No bed space in postnatal ward	505 (85.4)
VIP	35 (5.9)
Magpie study	27 (4.6)
Eclampsia	11 (1.9)
Ruptured uterus	7 (1.2)
Severe pre-eclamptic toxaemia	5 (0.8)
Post-spinal limb paralysis	1 (0.2)

Table I. Admission pattern by specialty

Department	No. of patients	%	Rank
Obstetrics & gynaecology	704	48.7	1
Neurosurgery	244	16.9	2
General surgery	225	15.5	3
Burns & plastics	115	7.9	4
Internal medicine	62	4.3	5
Accident & emergency	42	2.9	6
Urology	12	0.8	7
Orthopaedics	11	0.8	8
Cardiothoracic	10	0.7	9
Neuropsychiatry	6	0.4	10
Paediatrics	6	0.4	10
Maxillofacial	5	0.3	11
ENT	3	0.2	12
Anaesthesia	1	0.1	13
Ophthalmology	1	0.1	13
Total	1 447	100	

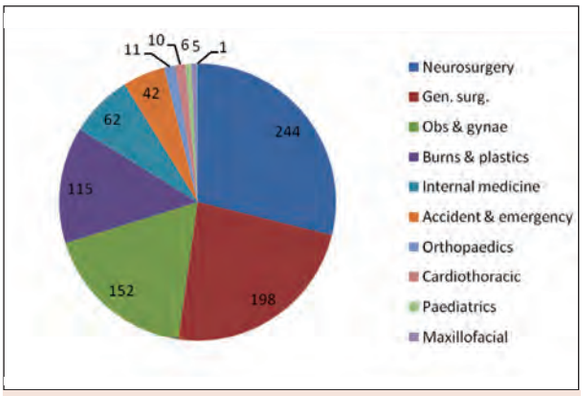

Fig. 2. Justifiable ICU admissions.

Severe head injury (GCS <6) accounted for 92.2% of the neurosurgical admissions, while 73.3% of general surgical patients were admitted after emergency exploratory laparotomy. Patients with 65 - 90% surface area burns comprised 97.4% of admissions from the burns unit, while acute renal failure, cerebrovascular disease, coma not due to trauma, and acute severe asthma were the most common indications for medical admission. Only 1 patient with a myocardial infarction was admitted to the ICU during the period under review.

Length of stay ranged from a few hours to 65 days, with a mean of 8.1±2.8 days and median of 4.5 days. Two patients required re-exploration following gunshot injuries to the abdomen, and another required high-dose penicillin infusions for 4 weeks for abdominal actinomycosis presenting as intestinal obstruction for which he had earlier undergone exploratory laparotomy. All stayed longer than a month.

One pregnant patient with acute severe asthma was manually ventilated for 5 hours. All patients had monitoring of manual blood pressure, pulse rate, respiration and temperature, urine output and level of consciousness; only 2 had non-invasive blood pressure, heart rate and SpO_2 monitoring. There were also no facilities for haemodialysis, but 3 paediatric patients had peritoneal dialysis. Unconscious patients were turned every 2 hours and pressure areas were supported. Feeding was by nasogastric tube in unconscious patients and oral in those who were conscious. Feeding usually commenced when bowel sounds were noted, and bowel sounds were monitored regularly in unconscious patients.

Analysis of outcome (Table III) showed that 597 patients (41.3%) were transferred to the ward and 352 (24.3%) were discharged home from the ICU. Outcome was not indicated in 128 cases (8.8%), 16 patients (1.1%) left the ICU against medical advice, 1 patient (0.1%) was referred to another tertiary institution and 1 (0.1%) absconded. A total of 352 patients died giving a mortality rate of 24.3%.

Table III. Analysis of outcome

Outcome	No. (%)
Transferred to ward	597 (41.3)
Discharged home	352 (24.3)
Died	352 (24.3)
Outcome not indicated	128 (8.8)
Left against medical advice	16 (1.1)
Referred to University College Hospital	1 (0.1)
Absconded	1 (0.1)
Total	1 447

Discussion

The creation of ICUs owes much to the introduction of intermittent positive-pressure ventilation (IPPV), the therapeutic potential of which was first recognised during the 1950s when it was used to support patients with respiratory failure due to poliomyelitis.[10] Since then awareness of its possibilities in the care of critically ill patients has grown, and ICUs have developed into purpose-built facilities, fully equipped with the most advanced medical technology and skilled personnel.

The appropriateness of ICUs in developing countries has been questioned, considering the fact that many of them face one economic crisis after another,[1] but there are critically ill patients in most hospitals, whether in developed or developing countries. In developing countries the emphasis should be on effective use of valuable resources as opposed to accumulation of non-functional equipment and/or admission of patients who do not in fact require intensive care.[2,3]

As has been found in other studies[3,6] most of the patients admitted into the UPTH ICU were young, but in contrast to those studies we admitted more females than males, the majority of them being post-CS cases. Obstetric patients may indeed require ICU admission, but the most common indications for this have been shown to be pre-eclampsia/eclampsia and obstetric haemorrhage.[11-13]

Isamade *et al*.[3] from Jos University Teaching Hospital, North Central Nigeria, reported that postoperative patients were admitted to their ICU to enable management of respiratory complications and cardiovascular instability. This was not the case in our study, which showed that the majority of post-CS admissions were because beds were not available in the post-natal wards. These patients did not require critical care, and the ICU was being used as an extension of the hospital's obstetric ward.

There was better monitoring and a higher nurse/patient ratio in the ICU than in the general wards in the hospital. It was also the only ward that had air-conditioning, so it was used to ensure a more comfortable stay for some patients, especially VIPs.

Establishment of an admission and discharge policy is important in every ICU,[2] and admission of a patient who is at low risk, too healthy, or can be managed in a general ward constitutes an unnecessary admission[2,3] and a potential waste of resources, and should be discouraged. Amenity wards should be established in the hospital to which patients who are at low risk but desire privacy, more comfort than the general wards can provide, and more (but not necessarily critical) nursing care and can afford to pay for it can be admitted. This will ensure that critical care beds are not tied up with unnecessary admissions, as we found in this analysis, and patients who are critically ill and may benefit from care denied admission. A patient should not be kept in the ICU because the ward is full.[2]

It is important that one person should have overall responsibility for the running of the ICU.[2] In our hospital, as in other hospitals in Nigeria,[3,5,6,14] the ICU is a unit in the Department of Anaesthesiology, headed by one of the consultants. This adds to the workload of consultant anaesthetists,[14,15] who in some hospitals are also responsible for procurement of equipment and arrangements for its maintenance.[15] Establishment of policies may be more strictly adhered to when an ICU is a separate department, as it is in most developed countries, with full-time doctors and career intensivists who do not have other responsibilities outside the ICU. It is our opinion that full-time doctors will improve management of the ICU.

During the period under review, only level 1 care[2] (basic monitoring of pulse, blood pressure, respiration, temperature, level of consciousness and urine output; regular turning of the patient, nasogastric feeding and suctioning of intubated patients) could be provided in this ICU. There was no mechanical ventilation or cardiac monitoring. Although a non-invasive cardiac monitor was acquired, only 2 patients benefited from its use as it soon malfunctioned and could not be properly repaired. There was therefore no continuous cardiac monitoring or invasive cardiac monitoring. There was also no mechanical ventilator in the hospital during the study period, so no patient could be mechanically ventilated. The pregnant patient with clinically diagnosed respiratory failure due to acute severe asthma was successfully manually ventilated, and anaesthetists manually ventilated all patients requiring anaesthesia and IPPV, even for operations lasting up to 10 hours.

Although some studies have reported higher mortality in ventilated patients,[5,6,7] ventilatory support is essential in cases such as acute severe asthma, multiple trauma and abdominal sepsis. Ventilation of such patients may last several days or even weeks, during which manual ventilation could not be sustained. Level 2 care[2] aims to provide mechanical ventilation and cardiac monitoring facilities over and above the basic care of level 1[2] and is appropriate for a teaching hospital such as UPTH.

The enteral route we used in our ICU is the preferred route for nutrition in the ICU and should be encouraged when possible.[16] It is cheaper and more physiological than parenteral feeding and reduces the risk of peptic ulceration.

A number of patients managed in our ICU were either discharged to the wards as soon as bed space was available or discharged home. They did not require ICU admission, but contributed to the outcome in this analysis. In contrast, 2 patients required re-exploration after gunshot injuries to the abdomen and another required high-dose penicillin infusions for 4 weeks for abdominal actinomycosis presenting as intestinal obstruction for which he had earlier undergone exploratory laparotomy. All these stayed longer than 1 month.

Severity of illness affects outcome, and in the ICU increased length of stay is associated with increased cost.[2,17] Various scoring systems for use in the ICU have been developed over the past 30 years. They enable severity of disease to be assessed and help predict prognosis and outcome.[18] The updated Acute Physiology and Chronic Health Evaluation (APACHE), Simplified Acute Physiology Score (SAPS) and Mortality Prediction Models (MPM) are relevant in intensive care, and have been rigorously tested, validated and found practicable.[17,18] However, these scoring systems may be difficult to use in ICUs in developing countries because of reliance on laboratory tests such as arterial blood gases and serum creatinine, which may not be readily available.[2] A Clinical Sickness Score using only clinical parameters has been developed,[2] and may be useful in this situation.

Outcome was not indicated for 8.8% of the patients admitted to this ICU, so it could not be ascertained whether they had been discharged to the ward or discharged home, or had died. Accurate record keeping is part of the high standard of care required of medical personnel[19,20] and admission and discharge summaries should be documented. Accurate records are helpful for purposes of audit, teaching and research and for medico-legal reasons. All the records in our ICU were manually written and kept by nurses. With a nurse/patient ratio of 1:4, it is unlikely that records would have been kept accurately. Computerisation of the records would have helped considerably in maintaining accuracy, and would have been helpful in retrieving relevant data.

The overall mortality rate of 24.3% is significantly lower than the findings in other studies from Nigeria[3-6,21] and

Ouagadougo,[7] but this is not unexpected, as a significant number of the patients admitted were not critically ill.

Conclusion

Over a 10-year period 1 447 patients were admitted to the ICU. The highest proportion of these admissions were from the Departments of Obstetrics and Gynaecology and Surgery. Many of the patients did not actually require intensive care, but had to be admitted because there were no beds in the wards. Adherence to policies and upgrading of services to a level appropriate for a tertiary health facility is necessary, as is improved record keeping through computerisation.

Since this analysis, the UPTH has moved to its permanent site and has an ICU with more modern facilities.

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