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# An experience with surgical admissions to a paediatric ICU (PICU) in Harare, Zimbabwe

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## Abstract

**Objective:** To find out if the status of a patient on arrival in the intensive care unit had any bearing on the immediate ICU outcome and if there are any correctable factors.

**Design:** A retrospective survey.

**Setting:** Paediatric intensive care unit (PICU) at Parirenyatwa Hospital in Harare, Zimbabwe between January 1997 and December 1998.

**Subjects:** 147 emergency surgical admissions.

**Results:** There were 147 surgical patients admitted to the PICU during the period of whom 77 were male and 43 were emergency surgical procedures. All patients were coming from the operating theatres (OT). Factors associated with a poor ICU outcome were emergency surgical admission ( $p < 0.001$ ), hypothermia on arrival

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in the PICU ( $p < 0.001$ ) and requirement for ventilation ( $p < 0.001$ ). On multivariate analysis only the first two were associated with a poor ICU outcome.

**Conclusion:** Some simple measures could be undertaken to improve immediate ICU outcome in surgical patients in a resource limited environment, such as improving the ambient temperature in OT during surgery and standardising transportation to PICU.

## Introduction

The provision of appropriate care for the critically ill plays an important role in reducing mortality and morbidity after surgery. However, critical care is expensive<sup>1</sup> even in the advanced countries and its availability is limited in developing countries especially those in Africa. It is also now accepted that children have better outcomes when cared for in a PICU as opposed to a general ICU.<sup>2-4</sup> This further limits the prognosis for children in the developing world where there are more general ICUs as compared to PICUs.

The PICU in Parirenyatwa Hospital in Harare is the only one of its kind in Zimbabwe. It is a five-bedded unit which takes both medical and surgical patients from birth to 12 years of age. The PICU is situated some distance from the operating theatres (OT), which are on a different floor in the hospital. The brief journey from the OT to the PICU could have an impact on outcome so this study was done to see what impact the status of the patient on arrival in PICU had on outcome.

## Materials and Methods

A retrospective study was carried out on all surgical admissions to the PICU from January 1997 to December 1998. Data was collected on the patient demographics, type of surgery performed, and status of the patient as regards temperature, blood pressure, ventilatory status, any other events on arrival in PICU and the immediate ICU outcome. The results were analysed using Chi-squared tests for categorical data and t tests for continuous normally distributed variables. Odds ratios for poor outcomes were calculated for the different groups of patients.

## Results

During the study period there were 305 patients admitted to the PICU; of these 147 were surgical cases. The ages of these surgical patients ranged from one day to 14 years (Q1; one year, Q3; six years) see Figure I. Seventy seven of them (52%) were male. The ICU stay ranged from less than an hour to 28 days (Q1; two days, Q3; five days) with a mean of 3.9 days (Figure II) The largest number of surgical patients were admitted after cardiac surgery and general surgery. The diagram shows the different surgical specialties that admitted patients to PICU (Figure III).

Figure I: Age distribution of post surgical patients admitted to PICU.

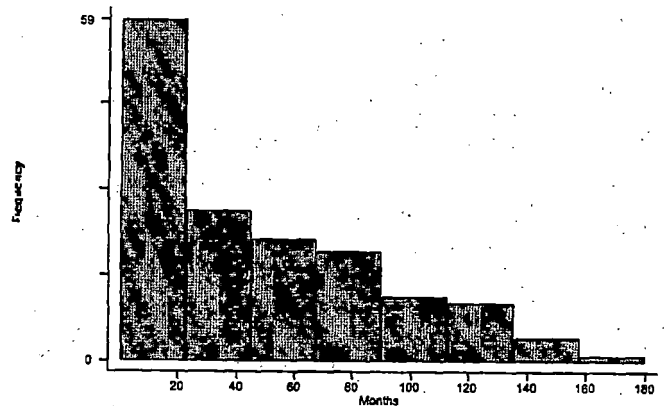


Figure II: Graph showing length of stay in ICU in days for the patients studied.

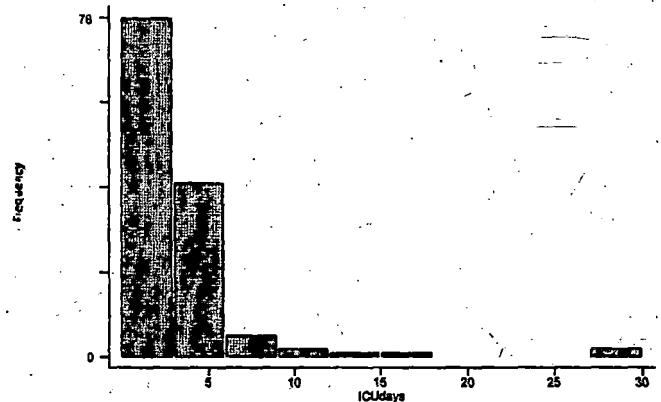
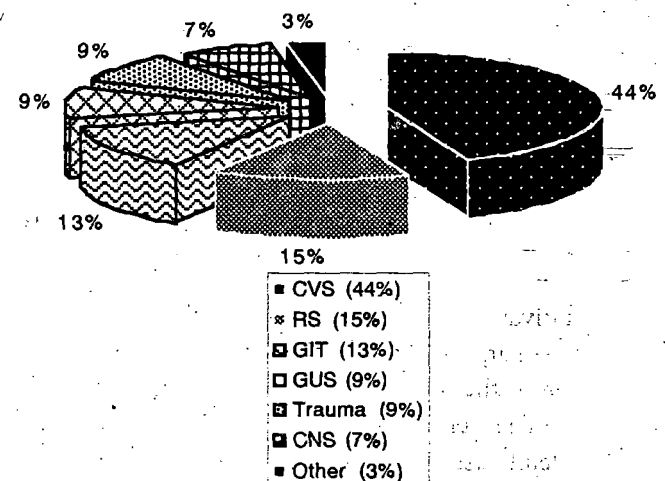


Figure III: Pie chart showing the body systems where surgery was performed.



There were 43 (29%) emergency operations and the rest were planned and had space booked in PICU in advance.

The overall ICU mortality was 32.3% for all admissions. Twenty seven of the surgical patients died giving a surgical ICU mortality rate of 18.4%.

*Table I: Contingency table of ICU outcome and type of surgical procedure.*

Procedure	Alive	Dead
Emergency	28	15
Planned	92	12

*Odds ratio for death 4.1 in the emergency cases (p<0.001).*

There were no significant statistical differences in age and sex distribution between the planned and emergency cases (p 0.875 and 0.5263 respectively)

Ninety nine patients were admitted for ventilation, making up nearly 70% of the surgical cases. There were 27 deaths among the ventilated patients with none in the non-ventilated.

*Table II: Contingency table comparing ICU outcome and ventilatory status of the patient.*

Ventilatory Status	Alive	Dead
Ventilated	72	27
Not Ventilated	48	0

*Odds ratio for death 4.6 times in the ventilated group (p<0.001). Fisher's Exact test.*

Three cases of accidental extubation were noted on arrival to PICU out of the 99 intubated patients.

Thirty eight patients (26%) arrived in PICU with a temperature below 36°C and a low temperature on arrival in PICU was associated with a poor outcome

*Table III: Relationship between ICU outcome and temperature on arrival in PICU.*

Temperature on arrival in PICU	Alive	Dead
Below 36°C	25	13
Above 36°C	96	12

*Odds ratio for death if low temperature is 4.16 times ones with normal temperature (p=0.001).*

On multivariate analysis of the above, performance of an emergency surgical procedure and a low temperature on admission to the ICU were associated with a poor ICU outcome. The ventilatory status of the patient was not independently associated with poor outcome.

*Table IV: Multivariate analysis showing the relationship of poor outcome to temperature on admission and type of surgical procedure performed.*

Variable	Odds ratio	95 confidence interval	p value
Low temperature (<36°C) on admission	14.3	2.73 – 75.2	0.002
Emergency procedure	10.3	2.2 – 48.5	0.003

## Discussion

ICU care is very costly, more so in the developing world<sup>1</sup> and cost constraints affect mortality. This study shows that certain factors may affect mortality and it is possible some of these can be controlled at minimal cost. Temperature control during surgery and transport to the PICU is one such factor found in this study. Though hypothermia post operatively is said to be common<sup>11,12</sup> this study shows the situation to be too prevalent in post surgical patients arriving in the PICU in Harare. A low temperature on arrival in PICU may reflect other factors like shock. Better monitoring and fluid resuscitation before and during surgery would probably reduce some of these problems. One recent study showed that monitoring of temperature during regional anaesthesia was inadequate.<sup>5</sup> Adverse outcomes have been reported in patients who develop even mild hypothermia in the peri-operative period.<sup>6,7,10</sup> The data from this study has been in keeping with these studies. General anaesthesia has been reported to be associated with hypothermia for a number of reasons<sup>8,9</sup> with some drugs like fentanyl more likely to cause hypothermia.<sup>9</sup> Increasing ambient temperature in the OT has been found to reduce the incidence of hypothermia<sup>11</sup> and this is indeed an affordable means of reducing adverse outcome post operatively. OT staff should be more alert to the problems of hypothermia during surgery especially on mixed adult and paediatric operating lists as is common in the developing world. The same would also apply to transport protocols for the short but critical journey between the OT and PICU. It seems that in our setting, more caution was taken to prevent hypothermia in the smaller children but similar care should also be taken with bigger children as they had a high incidence of hypothermia.

There were three accidental extubations during transport to PICU in this study period. This figure is rather high and could be reduced if policies on extubation in the OT or PICU are formulated and implemented and appropriate sedation given prior to transporting patients to PICU. This, together with better temperature control could be part of improved protocol-based transportation of children to the ICU from the OT.

It was noted that patients transported by junior anaesthetists or nurses on their own were at a higher risk of a bad outcome.

Emergency admissions fared worse than planned admissions and again this has a lot of complex factors to account for it. It is well known that patients delay seeking

medical attention to the last possible moment and are much sicker by the time they get their operation. Education campaigns already in place for other health-related issues could be used to encourage earlier use of medical facilities on a more general scale without incurring massive costs.

Though on univariate analysis patients who were ventilated fared worse than those who were not ventilated, ventilation *per se* was not associated with a poor outcome on multivariate analysis. One possible explanation for this could be that patients who had emergency surgical procedures were more likely to be left ventilated as a precautionary measure till they were really better. Also since some emergency surgical procedures are performed out of normal working hours, it is possible that such patients are more likely to be left on the ventilator till normal working hours when there are more staff to extubate the patients.

In view of the fact that this is a retrospective study, with all its attendant limitations, the issues raised in this study would be best addressed in a formal prospective study of emergency surgical admissions to the ICU.

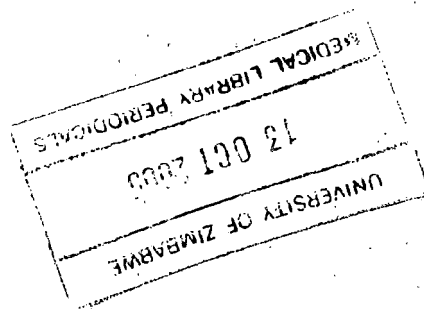
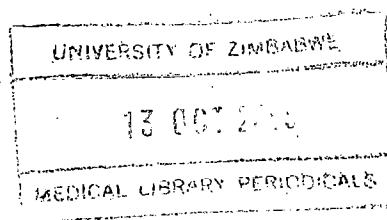
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### References

1. Sachdeva RC. Intensive care — a cost-effective option for developing countries? *Indian J Paediatr* 2001;68(4):339-42.
2. Pollack MM, Alexander SR, Clarke N, Ruttimann UE, Tesselaar HM, Bachulis AC, *et al.* Improved outcomes from tertiary center pediatric intensive: a statewide comparison of tertiary and nontertiary care facilities. *Crit Care Med* 1991;19:150-9.
3. Gemke RBJ, Bonsel GJ. The Pediatric Intensive Care Assessment of Outcome (PICASSO) Study Group. Comparative assessment of pediatric intensive care: a national multicenter study. *Crit Care Med* 1995;23:238-45.
4. Pearson G, Shann F, Barry P, Vyas J, Thomas D, Powell C, *et al.* Should paediatric intensive care be centralised? Trent versus Victoria. *Lancet* 1997;349:213-17.
5. Frank SM, Nguyen JM, Garcia CM, Barnes RA. Temperature monitoring practices during regional anaesthesia. *Anesth Analg* 1999;88:373-7.
6. Rosenberg J, Sessler DJ. Mild intra-operative hypothermia. Another risk factor for post operative complications. *Ugeskr Laeger* 1999;161:2935-8.
7. Mahoney CB, Odom J. Maintaining intraoperative normothermia: a meta-analysis of outcomes with costs. *AANA J* 1999;67:155-63.

8. Ikeda T, Ozaki M, Sessler DI, Kazama T, Ikeda K, Sato S, *et al.* Intra-operative phenylephrine infusion decreases the magnitude of redistribution hypothermia. *Anesth Analg* 1999;89:462-5.
9. Okada Y, Powis M, McEwan A, Pierro A. Fentanyl analgesia increases the incidence of post-operative hypothermia in neonates. *Pediatr Surg Int* 1998;13:508-11.
10. Flores-Maldonado A, Medina-Escobedo CE, Rios-Rodriguez HM, Fernandez-Dominguez R. Mild peri-operative hypothermia and the risk of wound infection. *Arch Med Res* 2001;32:227-231.
11. El-Gamal N, El-Kassabany N, Frank SM, Amar R, Khabar HA, El-Rahmany, HK, *et al.* Age-related thermoregulatory differences in a warm operating room environment. *Anesth Analg* 2000;90:694-8.
12. Kober A, Scheck T, Fulesdi B, Lieba F, Vlach W, Friedman A, *et al.* Effectiveness of resistive heating compared with passive warming in treating hypothermia associated with minor trauma: a randomised trial. *Mayo Clinic Proceedings* 2001;76:369-75.





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