



ASSESSMENT AND OPTIMIZATION OF PROGNOSTIC SCORES IN PORTUGUESE PEDIATRIC INTENSIVE CARE UNITS

“Are they doing a good job?”

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Introduction

Rapid advances in **critical care technology** and **rising cost** of medical care have spurred the development of outcome analysis including **mortality risk prediction**[1,2]. Severity scoring systems integrate clinical data to **estimate the probability of mortality**, which can be used to facilitate **resource utilization** or continuing **quality improvement** and to stratify patients for **clinical research** [2,3,4].

In spite of the development of **specifics scores for pediatric populations** in intensive care context and more, their effective **validation at located realities**, no validation evidences, in order to its application in Portuguese PICUs, have already been referenced.

The present study, developed in the course of *Introdução à Medicina* at *Faculdade de Medicina da Universidade do Porto*, intends **to assess and to optimize the Pediatric Risk of Mortality (PRISM and PRISM III) and the Pediatric Index of Mortality (PIM and PIM2) scoring systems**, in comparing the risk-adjusted mortality of children after admission in Portuguese Pediatric Intensive Care.

Material and Methods

Methods scheme was designed with base on three major tasks, above extensively described: **Data acquisition**, **Algorithms Calculation**, **Validity Statistical Assessment**.

Data was acquired from a **database previously created** in the context of the precursor project *Development and assessment of optimal risk scores for outcomes in paediatric intensive care (DAIP-CIP)*, conducted in the filiation’s institution.

The PRISM, PRISM III, PIM and PIM-2 scores of all patients included in the study were computed according to the **published algorithms**, and the outcome was noted in terms of survival or non-survival and compared with observed mortality, by **Standardized Mortality Ratio (SMR)**. **Mortality discrimination** was quantified by calculating the **area under the receiver operating characteristic (ROC) curve**. **Hosmer and Lemeshow goodness-of-fit test** was used to assess **scores calibration**.

Results

One thousand and eight hundred and nine patients, with a mean age and male to female ratio of: 1.2:1, admitted at three volunteers Portuguese PICUs (Hospital Pediátrico de Coimbra, Hospital de São João, Hospital Dona Estefânia) were enrolled.

	Value
Number of patients	1809
Observed mortality (%)	(8.6)
Age	
mean (standard deviation)	4.6 (4.83) years
Internament duration	
mean (standard deviation)	7.7 (23,0) days
Gender: male (N (%))	977 (54)
Admission reason (%)	
•Surgery	(37.3)
•Medical	(59.9)
•Monitorization and prevention	(2.9)
Mechanical ventilation during internament(%)	(57.4)

Table 1 - Study group characteristics (Patients’ demographic, type of admission and general diagnostic categories).

Score	Expected Mortality(%) Mean (SD)	Discrimination SMR (CI 95%) AUC	Calibration		
			Chi-square	p-value	
PIM (n = 1809)	6.0 (0,4)	1.43 (1.21 - 1.66)	0,84	4,05	0,132
PIM2 (n = 1809)	5.3 (0,3)	1.62 (1.37 - 1.87)	0,89	7,23	0,027
PRISM (n = 1809)	9.9 (0,6)	0.87 (0.74 - 1.00)	0,9	3,62	0,305
PRISM III (n = 1809)	7.4 (0,5)	1.16 (0.98-1.34)	0,91	1,96	0,375

Table 2 - Expected mortality, Standardized Mortality Ratio, Discrimination and Calibration according to original scores prediction.

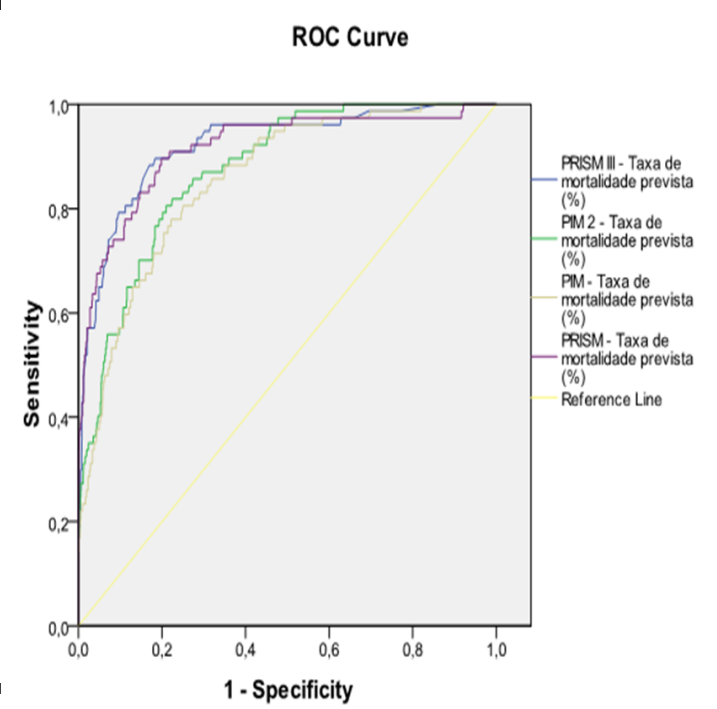


Figure 1 - Receiver operating characteristics (ROC) curves

Conclusion

- Excluding PIM2, the predicted mortality using all prediction models **correlated well with the observed mortality**.
- All of them offer a **good capacity of discrimination** between survivors and moribund patients.
- With the exception of PIM2, all scores are tools with **comparable performance at the prognostic evaluation of the pediatric patients** admitted at a general Portuguese PICU.

It is now important that these tools be used to monitor outcome and to improve the quality of pediatric intensive care within Portugal.

References

[1] Gemke RJ, Bonsel GJ, Bought AJ. Outcome assessment and quality assurance in pediatric intensive care. In: Tibboel D, van der Voort E, editors. Intensive care in childhood – a challenge to future. 2nd ed. Berlin: Springer; 1996. p. 117-32.

[2] Mitchell I. Nature and nurture: the future of predictor variables. Curr Opin Crit Care. 2000;6:166-70.

[3] Pollack MM, Ruttimann UE, Getson PR. The Pediatric Risk of Mortality (PRISM) score. Crit Care Med. 1988;16:1110-6.

[4] PRISM III: an updated Pediatric Risk of Mortality score. PRISM III: An updated Pediatric Risk of Mortality score. Crit Care Med. 1996;24:743-52.

[5] Shann F, Pearson G, Slater A, Wilkinson K. Paediatric index of mortality (PIM): a mortality prediction model for children in intensive care. Intensive Care Med. 1997;23:201-7.

[6] Slater A, Shann F, Pearson G. PIM2: a revised version of the Paediatric Index of Mortality. Intensive Care Med. 2003;29:278-85.

[7] Brady, R. A. (2006). *Assessment and Optimization of Mortality Prediction Tools for Admissions to Pediatric Intensive Care in the United Kingdom. Pediatrics*;

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