Universidade do Minho
Escola de Engenharia

Semana da Escola de Engenharia
October 24 - 27, 2011

ASSESSING THE PERFORMANCE OF NEONATOLOGY UNITS

Maria Filipa Mourão
Escola Superior de Tecnologia e Gestão
Instituto Politécnico de Viana de Castelo fmourao@estg.ipvc.pt
Ana Cristina Braga
Departamento de Produção e Sistemas
Universidade do Minho
acb@dps.uminho.pt
Pedro Oliveira Instituto de Ciências Biomédicas Abel Salazar
pnoliveira@icbas.up.pt

KEYWORDS
Performance measurement, CRIB, ROC analysis.

ABSTRACT

The mortality rate is considered one of the most important indicators to evaluate the performance of care in neonatology units. Newborns weighing less than 1500 g or with gestational age less than 37 weeks are those that contribute most to mortality and neonatal morbidity. However, several clinical severity indexes have been developed due to the fact that the mortality rate can be influenced and should be adjusted for severity of illness. Several techniques for evaluating performance of clinical indices have been developed, highlighting the ROC (Receiver Operating Characteristic) analysis. This analysis allows the study of variation in the 1-specificity or False Positive Fraction (FPF) and sensitivity or True Positive Fraction (TPF), graphically represented in the axis (x, y) considering all possible cutoff values of the scale, providing a global representation of the accuracy of that scale. The graph thus obtained is called Roc curve that is an empirical description of the capacity of the scale can discriminate between two states (abnormal, normal) in which each point represents a compromise between different TPF and FPF obtained, for example, by adopting different cutoff values (Metz, 1986) and enjoying the advantage of allowing the comparison of different clinical severity scores (Hanley and McNeil, 1983). The scale of clinical severity CRIB - Clinical Risk Index for Babies, appeared in 1993 to predict mortality of infants under 32 weeks of gestation (The International Network Group, 1983; Dorling, Field and Manktelow, 2005). In this work we use ROC analysis to evaluate the performance of the CRIB index in the classification of health status of newborns with low birth weight in two Portuguese neonatal intensive care units and simultaneously compare the performance of these two units.

REFERENCES

Braga, A. C., Oliveira, P., Gomes, A. (1997), "Avaliação do risco de morte em recém-nascidos de muito baixo peso: uma comparação de índices de risco baseada em curvas ROC". IV Congresso Anual da Sociedade Portuguesa de Estatística. Editores: Luísa Canto e Castro, Dinis Pestana, Rita Vasconcelos e Isabel Fraga Alves. Edições Salamandra.

Dorling, J.S., Field, D.J.,and Manktelow, B.(2005). "Neonatal disease severity scoring systems". Arch. Dis. Child. Fetal Neonatal, 90:F11-F16.

Green, D.M., Swets, J.A. (1974), "Signal Detection Theory and Psychophysics (rev. ed)". Huntington NY, Krieger

Hanley, J.A., McNeil, B.J. (1982),"The meaning and use of the area under a receiver operating characteristic (ROC) curve". Radiology, 143:29-36.

Hanley, J.A., McNeil, B.J. (1983), "A method of comparing the areas under receiver operating characteristic curves derived from the same cases". Radiology, 148:839

Metz, C.E. (1986). "Statistical Analysis of ROC Data in Evaluating Diagnostic Performance. Multiple Regression Analysis: Applications in the Health Sciences". American Institute of Physics,13:365-384.

The International Network Group (1993), "The CRIB (Clinical Risk Index for Babies) score: a tool for assessing initial neonatal risk and comparing performance of neonatal intensive care units". Lancet, 342: 193-198.