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Glasgow coma scale의 임상적 유용성 평가
- 중환자 중증도 분류도구 -

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Clinical Usefulness of Critical Patient Severity Classification System(CPSCS) and Glasgow coma scale(GCS) for Neurological Patients in Intensive care units(ICU)

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Summary

The tools that classify the severity of patients based on the prediction of mortality include APACHE, SAPS, and MPM. Theses tools rely crucially on the evaluation of patients' general clinical status on the first date of their admission to ICU. Nursing activities are one of the most crucial factors influencing on the quality of treatment that patients receive and one of the contributing factors for their prognosis and safety. The purpose of this study was to identify the goodness-of-fit of CPSCS of critical patient severity classification system(CPSCS) and Glasgow coma scale(GCS) and the clinical usefulness of its death rate prediction. Data were collected from the medical records of 187 neurological patients who were admitted to the ICU of C University Hospital. The data were analyzed through x^2 test, t-test, Mann-Whitney, Kruskal-Wallis, goodness-of-fit test, and ROC curve. In accordance with patients' general and clinical characteristics, patient mortality turned out to be statistically different depending on ICU stay, endotracheal intubation, central venous catheter, and severity by CPSCS. Homer-Lemeshow goodness-of-fit tests were CPSCS and GCS and the results of the discrimination test using the ROC curve were $CPSCS_0$, .734, GCS_0,.583, $CPSCS_{24}$,.734, GCS_{24}, .612, $CPSCS_{48}$,.591, GCS_{48},.646, $CPSCS_{72}$,.622, and GCS_{72},.623. Logistic regression analysis showed that each point on the CPSCS score signifies1.034 higher likelihood of dying. Applied to neurologically ill patients, early CPSCS scores can be regarded as a useful tool.

1. Introduction

The tools that classify the severity of patients based on the prediction of their mortality include the Acute Physiology and Chronic Health Evaluation(APACHE), the Simplified Acute Physiology Score(SAPS), and the Mortality Probability Model(MPM). These tools rely crucially on the evaluation of the patients general clinical status on the first date of their admission to ICU. These tools allow us to identify both the severity of the patients and their mortality probability. Another set of tools based on therapeutic interventions is exemplifies by the Therapeutic Intervention Scoring System(YISS-28) (Kiekkas et al, 2007). The tools of the APACHE, SAPS, and MPM that classify the severity based on mortality have recently been revised, and the new versions of APACHE Ⅲ, SAPS Ⅱ, and MPM Ⅱ continues to be useful and appropriate for predicting the patients' mortality(Lemeshow et al, 1993, Youn & Kim, 2005). To take an example, a study performed in North American general hospitals found that adding one patient per nurse resulted in a 7% increase in the risk of death 30 days after admission, and a 7% increase in the risk of death by complications(Taunton, Kleinbeck, Stafford, Woods, & Bolt, 1994). For this reason, the Korean Association of Hospital Nurse developed the critical patient severity classification system(CPSCS) in 1994, which was partly revised in 2004 by the Committee of Intensive Care Nursing of the same association and are now used in many hospitals and other medical institutions. This system grades based on the TISS-28 classification tool and the Walter Reed Medical Centers's classification of patients.

The purpose of present study was to identify the goodness-of-fit of the CPSCS and GCS and the clinical usefulness of its death rate prediction. The following research question guided this study : Are ther any significant differences in the severity according to the general and clinical characteristics of critical patients based on the CPSCS and GCS?

2. Methods

2.1 Design

The current study id a survey of the critical patients in the intensive care unit of C Hospital located in Seoul, Korea. It is a case control study to test the usefulness of the CPSCS and GCS for neurological patients in ICUs.

2.2 Samples

The present study was analyzed using medical records of 187 critical patients who were hospitalized in the intensive care unit of C Hospital from January 2008 to May 2009. The subject patients were all adults older than 18 years old with neurologic diseases. We excluded patients who had burn, coronary artery diseases, and heart surgeries.

2.3 Data analysis

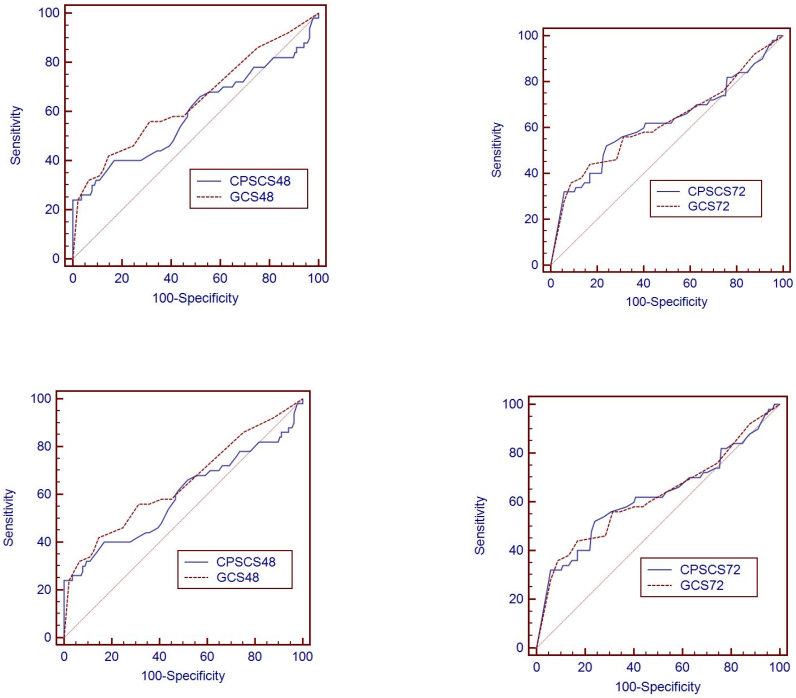
The collected data were analyzed using SPSS 18.0 and MecCalc 11.5.1.0. The general and clinical characteristics of the patients were analyzed to produce technical statistics including the means, standard deviations, frequencies, and percentages. As far as the differences in death tares according to the general and clinical characteristics are concerned, the factors that showed normal distribution were analyzed with X2 and t-test and those without normal distribution were tested by Mann-Whitney and Kruskal-Wallis test. The goodness-of-fit of the CPSCS and GCS validabilities was identified by the Hosmer-Lemeshow's test and the predictability of death rates of CPSCS and GCS was, in turn, identified by MecCalc 11.5.1.0, via contrasive analysis of AUC of ROC curves. Predictions of their death rates were identified using a logistic regression analysis.

3. Results

Table 1. Hosmer-Lemeshow Goodness-of Fit Test and ROC Curve for Critical patient Severity Classification System(CPSCS) & Glasgow Coma Scale(GCS)

Hosmer-Lemeshow Goodness-of Fit							ROC Curve			
Characteristics	Survived		Died		χ^2	p	Characteristics	AUC	Z	p
Probability of dying	observed	expected	observed	expected						
CPSCS & GCS										
1(0.0 ≤p<0.1)	17	18.106	2	.894	4151	.843	CPSCS $_{0hr}$	.734	2.563	.010
2(0.1 ≤p<0.2)	18	17.637	1	1.363			GCS $_{0hr}$	.583		
3(0.2 ≤p<0.3)	17	17.184	2	1.816			CPSCS $_{24hrs}$	.734	2.220	.029
4(0.3 ≤p<0.4)	17	16.476	2	2.727			GCS $_{24hrs}$	.612		
5(0.4 ≤p<0.5)	16	15.402	3	3.598			CPSCS $_{48hrs}$	.591	.077	.440
6(0.5 ≤p<0.6)	13	14.055	6	4.945			GCS $_{48hrs}$	.646		
7(0.6 ≤p<0.7)	13	12.597	6	6.403			CPSCS $_{72hrs}$	.622	.018	.988
8(0.7 ≤p<0.8)	13	10.989	6	8.011			GCS $_{72hrs}$	.623		
9(0.8 ≤p<0.9)	7	9.022	12	9.978						
10(0.9≤p<1.0)	6	5.735	10	10.265						

Figure 1 . ROC Curves of $CPSCS_0$,GCS_0, $CPSCS_{24}$, GCS_{24}, $CPSCS_{48}$ GCS_{48}, and $CPSCS_{72}$, GCS_{72}



4. Conclusion

The analysis reveals that several statistically significant differences are found in the test of differences in mortality based on general and clinical characteristics in such areas as length of ICU stay, endotracheal tube insertion, central venous catheter, and severity of CPSCS. The differences in relation to the length of ICU stay is supported by Kanus, Wagner, Zimmerman, and Draper's(1993) report on the mortality of their patients. Lemeshow et al(1993) reported a rapid increase in mortality with the passage of length of ICU stay : 3.0% within 24 hours and 21.8% after 24 hours. Lee et al (2003) reported that the length of stay is closely related to infection symptoms and argued that infection is a crucial factor influencing the mortality of ICU patients. It was suggested that we should prepare nursing interventions to decrease the length of ICU stay.

References

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