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Research Article / Araştırma

PRISM and APACHE II Scoring Systems in Pediatric Cardiac Surgery Intensive Care Unit

Pediatrik Kalp Cerrahisi Yoğun Bakım Ünitesinde PRISM ve APACHE II Skorlama Sistemleri

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ABSTRACT

Objectives: This study aims to investigate the reliability and validity of the Pediatric Risk of Mortality (PRISM) score in determining the mortality in patients who have undergone arterial switch in pediatric cardiac surgery (PCS) intensive care unit (ICU), to compare these scoring systems with the Acute Physiology and Chronic Health Evaluation (APACHE) II scoring system modified as per the pediatric age group, and to establish the most appropriate scoring system according to the patient characteristics and intensive care conditions.

Methods: Performed retrospectively in 124 patients within the age range of 0-1 months between January 2005 and August 2011 in the PCS ICU of Dr. Siyami Ersek Thoracic and Cardiovascular Surgery Training and Research Hospital.

Results: The correlation analysis performed to establish the relationship between the PRISM score on day 1 and the mechanical ventilation time revealed a positive significant relationship between the scores (r=0.342; p<0.001). Accordingly, as the PRISM score on day 1 increases, the mechanical ventilation time also increases. The PRISM scores on day 1 and day 3 were found significantly high in exitus patients compared to the survivors (p<0.001 and p=0.049, respectively). The results were evaluated at 95% confidence interval.

Conclusion: The PRISM score is an important indicator in estimating the mortality in our ICU as in the literature. Further multicenter studies in more patient groups are required to do planning to improve the treatment services and results in pediatric intensive care unit throughout the country.

Keywords: APACHE, intensive care, pediatric cardiac surgery, PRISM

ÖZ

Amaç: Bu çalışmanın amacı, pediatrik kalp cerrahisi yoğun bakım ünitesinde arteriyel switch ameliyatı uygulanan hastalarda mortaliteyi belirlemede "Pediatric Risk of Mortality (PRISM)" skorunun güvenilirliğini ve geçerliliğini araştırmak, bu skorlama sistemlerini Akut Fizyoloji ve Kronik Sağlık Değerlendirmesi II (APACHE II) skorlama sistemiyle karşılaştırmak, pediatrik yaş grubuna göre modifiye edilerek, hasta özelliklerine ve yoğun bakım koşullarına göre en uygun skorlama sistemini oluşturmaktır.

Yöntem: Dr. Siyami Ersek Göğüs Kalp ve Damar Cerrahisi Eğitim ve Araştırma Hastanesi Pediatrik Kalp Cerrahisi Yoğun Bakım Ünitesinde Ocak 2005-Ağustos 2011 tarihleri arasında 0-1 ay aralığındaki 124 hasta retrospektif olarak çalışmaya dahil edildi.

Bulgular: Birinci gün PRISM skoru ile mekanik ventilasyon süresi arasındaki ilişkiyi belirlemek için yapılan korelasyon analizine göre skorlar arasında pozitif ve anlamlı bir ilişki saptandı (r=0,342; p<0,001). Bu sonuçlara göre birinci gün PRISM skoru arttıkça mekanik ventilasyon süresi de artmaktadır. Birinci gün ve üçüncü gündeki PRISM skorları, sağ kalanlara kıyasla eksitus olan hastalarda anlamlı derecede yüksek saptandı (p<0,001, p=0,049). Sonuçlar %95 güven aralığında değerlendirildi.

Sonuç: PRISM skorunun literatürde olduğu gibi yoğun bakım ünitemizde de mortaliteyi tahmin etmede önemli bir gösterge olduğu görüldü. Ülke genelinde çocuk yoğun bakım ünitelerindeki tedavi hizmetlerinin ve sonuçlarının iyileştirilmesi için daha fazla hasta grubunda çok merkezli çalışmaların planlanması gerekmektedir.

Anahtar sözcükler: APACHE, pediatrik kalp cerrahisi, PRISM, yoğun bakım ünitesi

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Introduction

The Physiologic Stability Index (PSI) is the first scoring system established in 1986 to be used in the pediatric intensive care units (ICUs). Being based on the effect of the physiological irregularity on the risk of mortality, PSI is regarded as the first version of the PRISM score. While the first version published in 1986 with the name of "PSI" included 24 variables, it was reviewed in 1988 and published as the second version with the name of "Pediatric Risk of Mortality" (PRISM) containing 14 variables. Some clinicians used this version with the name of PRISM II.

Pediatric index of mortality (PIM) scoring system described in 1997 by Shann et al.[1] was developed as an alternative to the PRISM.[1,2] The second version of this scoring system containing 10 variables was published in 2003. There are insufficient data regarding the validity and reliability of these scores in different countries and health systems. The Acute Physiology and Chronic Health Evaluation Score (APACHE) II is a common scoring system used to determine the risk of mortality in adult patients. There is no scoring system determined regarding a reliable and valid scoring system used for the pediatric cardiovascular surgery ICUs.

The aim of this study is to investigate the reliability and validity of the PRISM score in determining the mortality in patients who have undergone arterial switch in pediatric cardiac surgery (PCS) ICU, to compare these scoring systems with the APACHE II scoring system modified as per the pediatric age group, and to establish the most appropriate scoring system according to the patient characteristics and intensive care conditions.

Methods

This study was performed retrospectively in 124 patients within the age range of 0-1 month who were monitored between January 2005 and August 2011 in the PCS ICU of Dr. Siyami Ersek Thoracic and Cardiovascular Surgery Training and Research Hospital following the ethics committee approval with protocol number 2011/E-542 dated April 19, 2011. The study enrolled patients with the same cardiac pathology and age groups.

Pre-operative preparation of the patients was conducted in the anesthesiology and reanimation clinic. The comorbid diseases of the patients were determined, and the results of the necessary laboratory tests and imaging methods were evaluated. Blood preparation was performed for all patients before the surgery. Surgeries were performed by the same anesthesiologist who is specialized in PCS. The monitoring of ECG, peripheral oxygen saturation (SpO_2), and non-invasive blood pressure were performed in all patients routinely, and their baseline values were recorded. Radial artery cannulation with a 26-G cannula and central jugular cannulation were performed following the routine anesthesia induction (propofol 1.5 mg/kg+rocuronium bromide 0.6 mg/kg+fentanyl 2 mcg/kg) with 80% oxygen+20% air. Anesthesia was maintained with 2% sevoflurane. MV adjustments were made so that the $EtCO_2$ value was 35-40 mmHg. To prevent hypothermia, heaters with air blowing system (Bair Hugger Warming system, Augustine Medical, Eden Prairie, MN, USA) were used for intraoperative warming of the patients. Body temperature was measured with an oral temperature probe. In intravenous fluid maintenance, balanced electrolyte solution was adjusted. In case of hypotension in patients despite adequate fluid replacement, iv infusion of norepinephrine 0.02-0.2 mcg/kg/min or dopamine 5-10 mcg/kg was initiated as vasopressor and inotropic agents. The demographic data including age, gender, body weight, and ASA classification of the patients were recorded. Mean arterial pressure (MAP), heart rate (HR), SpO_2, body temperature, and $EtCO_2$ were recorded. The duration of surgery and anesthesia, and the amount of ICU stay were routinely recorded. All patients received mechanical ventilation in the PICU. All patients were followed up in SIMV-PS mode with a TV of 6-8 ml/kg. FiO_2 values were adjusted according to age-matched respiratory rate and whether the patient was cyanotic or acyanotic. 0.01-0.05 mg/kg midazolam and 1-3 mcg/kg/h fentanyl infusion were administered for post-operative sedoanalgesia. 0.1-1.5 mcg/kg/min adrenaline infusion was given to patients with low MAP for age, and if necessary, 0.375 mcg/kg/min milrinone was given as a second inotropic agent for patients with pulmonary hypertension. 0.025 mcg/kg/min noradrenaline infusion was given as the second agent in patients with age-matched hypotension.

The post-operative days 1, 3, and 7 values of the patients were recorded for the PRISM and APACHE II scoring. The correlation with the age, gender, presence of chronic disease, the length of intensive care stay, the need for mechanical ventilation, the mechanical ventilation time, development of complications due to the mechanical ventilation, and the survival or death in the intensive care were examined.

Statistical Analysis of the Data

The statistical analyses were performed using the statistical package program during the evaluation of findings obtained from the study. Besides the descriptive statistical methods (frequency, percentage, average, and standard deviation), Kolmogorov-Smirnov distribution test was also used to review the normal distribution in the evaluation of the study data.

Independent samples t-test was used to compare the quantitative data in the between-group comparisons in the case of two groups. The between scale relationships were determined using the Pearson's correlation analysis. The intragroup comparisons of the parameters of the scores were performed using repeated measures ANOVA and Bonferroni post hoc test.

The results were evaluated at 95% confidence interval, p<0.05 significance level and p<0.001 advanced significance level.

Results

The average duration of the patients was 7.78±9.79 days for the extubation time, 13.02±12.70 days for the length of ICU stay, and 8.91±10.37 days for the mechanical ventilation time (Table 1).

Twenty-two (17.7%) patients died, whereas 102 (82.3%) patients survived.

The average PRISM score of the patients was 6.27±3.26 on day 1, 4.28±3.08 on day 3, and 2.51±2.36 on day 7. The average modified APACHE score of the patients was 10.33±2.33 on day 1, 8.22±2.70 on day 3, and 7.60±1.88 on day 7 (Table 2).

There was a statistically significant decrease in the PRISM scores on day 3 as compared to those on day 1 (p=0.002). There was a statistically significant decrease in the PRISM scores on day 7 as compared to those on day 3 (p<0.001). There was a statistically significant decrease in the PRISM scores on day 7 as compared to those on day 1 (p<0.001).

There was a statistically significant decrease in the modified APACHE scores on day 3 as compared to those on day 1 (p=0.002). There was a statistically insignificant decrease in the modified APACHE scores on day 7 as compared to those on day 3 (p=0.054). There was a statistically insignificant decrease in the modified APACHE scores on day 7 as compared to those on day 1 (p=0.054).

The correlation analysis performed to establish the relationship between the change in the modified APACHE score from day 1 to day 3 and the change in the PRISM score from day 1 to day 3 revealed a positive significant relationship between the scores (r=0.463; p<0.001). Accordingly, the change in the modified APACHE score from day 3 to day 7 and the change in the PRISM score from day 3 to day 7 were correlated (r=442; p<0.001) (Table 3).

Table 1. Extubation time, length of ICU stay, and mechanical ventilation time

	n	Mean±SD (range)
Extubation time/day	103	7.8±9.8 (0-77)
Length of ICU stay/day	122	13.0±12.7 (0-100)
Mechanical ventilation time/day	109	8.9±10.4 (0-65)

ICU: Intensive care unit; n: Number; SD: Standard deviation.

Table 2. PRISM score and modified APACHE score (values are presented as mean±SD [range])

	Day 1 (n=116)	Day 3 (n=107)	Day 7 (n=84)
PRISM score	6.27±3.26 (0-20)	4.28±3.08 (0-14)	2.51±2.56 (0-9)
APACHE score	10.33±2.33 (6-14)	8.22±2.70 (6-14)	7.60±1.88 (6-12)

PRISM: Pediatric Risk of Mortality; APACHE: Acute Physiology and Chronic Health Evaluation; n: Number; SD: Standard deviation.

The correlation analysis performed to establish the relationship between the PRISM score on day 1 and the extubation time revealed a positive significant relationship between the scores (r=0.420; p<0.001). Accordingly, extubation time increases as the PRISM score on day 1 gets increased (Table 4).

The correlation analysis performed to establish the relationship between the PRISM score on day 3 and the extubation time revealed a positive significant relationship between the scores (r=0.196; p=0.048). Accordingly, extubation time increases as the PRISM score on day 3 gets increased (Table 4).

The correlation analysis performed to establish the relationship between the PRISM score on day 7 and the extubation time revealed no statistically significant relationship between the scores (r=0.179; p=0.113) (Table 4).

The correlation analysis performed to establish the relationship between the modified APACHE score on day 1 and the extubation time revealed a positive significant relationship between the scores (r=0.339; p<0.001). Accordingly, extubation time increases as the modified APACHE score on day 1 gets increased (Table 4).

The correlation analysis performed to establish the relationship between the modified APACHE score on day 3 and the extubation time revealed no statistically significant relationship between the scores (r=0.129; p=0.197) (Table 4).

Table 3. Correlation between the PRISM score and modified APACHE score

Dimensions	Dimension	r	p
Change in the APACHE score from day 1 to day 3	Change in the PRISM score from day 1 to day 3	0.463	0.000*
Change in the APACHE score from day 3 to day 7	Change in the PRISM 7 score from day 3 to day	0.442	0.000*

*p<001. PRISM: Pediatric Risk of Mortality; APACHE: Acute Physiology and Chronic Health Evaluation.

Table 4. The relationship between the extubation time, the length of ICU stay, and the mechanical ventilation time and scores

Time (days)	Score	n	r	p
Extubation time				
	PRISM score on day 1	103	0.420	**<0.001**
	PRISM score on day 3	102	0.196	**0.048**
	PRISM score on day 7	80	0.179	0.113
	APACHE score on day 1	103	0.339	**<0.001**
	APACHE score on day 3	102	0.129	0.197
	APACHE score on day 7	80	0.008	0.941
	Change in the PRISM score from day 1 to day 3	102	-0.173	0.081
	Change in the PRISM score from day 3 to day 7	80	0.001	0.996
	Change in the APACHE score from day 1 to day 3	102	-0.135	0.177
	Change in the APACHE score from day 3 to day 7	80	-0.083	0.464
Length of ICU stay				
	PRISM score on day 1	115	0.216	**0.020***
	PRISM score on day 3	107	0.128	0.190
	PRISM score on day 7	84	0.146	0.185
	APACHE score on day 1	115	0.262	**0.005***
	APACHE score on day 3	107	0.093	0.339
	APACHE score on day 7	84	-0.057	0.606
	Change in the PRISM score from day 1 to day 3	107	-0.124	0.202
	Change in the PRISM score from day 3 to day 7	84	0.043	0.697
	Change in the APACHE score from day 1 to day 3	107	-0.140	0.150
	Change in the APACHE score from day 3 to day 7	84	-0.089	0.419
Mechanical ventilation time				
	PRISM score on day 1	108	0.342	**0.000****
	PRISM score on day 3	105	0.200	**0.040***
	PRISM score on day 7	83	0.186	0.092
	APACHE score on day 1	108	0.309	**0.001****
	APACHE score on day 3	105	0.152	0.122
	APACHE score on day 7	83	-0.045	0.688
	Change in the PRISM score from day 1 to day 3	105	-0.126	0.199
	Change in the PRISM score from day 3 to day 7	83	0.012	0.914
	Change in the APACHE score from day 1 to day 3	105	-0.110	0.266
	Change in the APACHE score from day 3 to day 7	83	-0.136	0.220

*P<0.05 significance level; **p<0.001 advanced significance level; ICU: Intensive care unit; n: Number; PRISM: Pediatric Risk of Mortality; APACHE: Acute Physiology and Chronic Health Evaluation.

The correlation analysis performed to establish the relationship between the modified APACHE score on day 7 and the extubation time revealed no statistically significant relationship between the scores (r=0.008; p=0.941) (Table 4).

No significant relationship was found between the extubation time and change in the PRISM score from day 1 to day 3, change in the PRISM score from day 3 to day 7 (p=0.081 and p=0.996, respectively), change in the modified APACHE score from day 1 to day 3, and change in the modified APACHE score from day 3 to day 7 (p=0.177 and p=0.464, respectively) (Table 4).

The correlation analysis performed to establish the relationship between the PRISM score on day 1 and the length of ICU stay time revealed a positive significant relationship between the scores (r=0.216; p=0.020). Accordingly, the length of ICU stay increases as the PRISM score on day 1 gets increased (Table 4).

The correlation analysis performed to establish the relationship between the PRISM score on day 3 and the length of ICU stay revealed no statistically significant relationship between the scores (r=0.128; p=0.190) (Table 4).

The correlation analysis performed to establish the relationship between the PRISM score on day 7 and the length of ICU stay revealed no statistically significant relationship between the scores (r=0.146; p=0.185) (Table 4).

The correlation analysis performed to establish the relationship between the modified APACHE score on day 1 and the length of ICU stay time revealed a positive significant relationship between the scores (r=0.262; p=0.005). Accordingly, the length of ICU stay increases as the modified APACHE score on day 1 gets increased (Table 4).

The correlation analysis performed to establish the relationship between the modified APACHE score on day 3 and the length of ICU stay revealed no statistically significant relationship between the scores (r=0.093; p=0.339) (Table 4).

The correlation analysis performed to establish the relationship between the modified APACHE score on day 7 and the length of ICU stay revealed no statistically significant relationship between the scores (r=–0.057; p=0.606) (Table 4).

No significant relationship was found between the length of ICU stay and change in the PRISM score from day 1 to day 3, change in the PRISM score from day 3 to day 7 (p=0.202 and p=0.697, respectively), change in the modified APACHE score from day 1 to day 3, and change in the modified APACHE score from day 3 to day 7 (p=0.150 and p=0.419, respectively) (Table 4).

The correlation analysis performed to establish the relationship between the PRISM score on day 1 and the mechanical ventilation time revealed a positive significant relationship between the scores (r=0.342; p<0.001). Accordingly, mechanical ventilation time increases as the PRISM score on day 1 gets increased (Table 4).

The correlation analysis performed to establish the relationship between the PRISM score on day 3 and the mechanical ventilation time revealed a positive significant relationship between the scores (r=0.200; p=0.040). Accordingly, mechanical ventilation time increases as the PRISM score on day 3 gets increased (Table 4).

The correlation analysis performed to establish the relationship between the PRISM score on day 7 and the mechanical ventilation time revealed no statistically significant relationship between the scores (r=0.186; p=0.092) (Table 4).

The correlation analysis performed to establish the relationship between the modified APACHE score on day 1 and the mechanical ventilation time revealed a positive significant relationship between the scores (r=0.309; p=0.001). Accordingly, mechanical ventilation time increases as the modified APACHE score on day 1 gets increased (Table 4).

The correlation analysis performed to establish the relationship between the modified APACHE score on day 3 and the mechanical ventilation time revealed no statistically significant relationship between the scores (r=0.152; p=0.122) (Table 4).

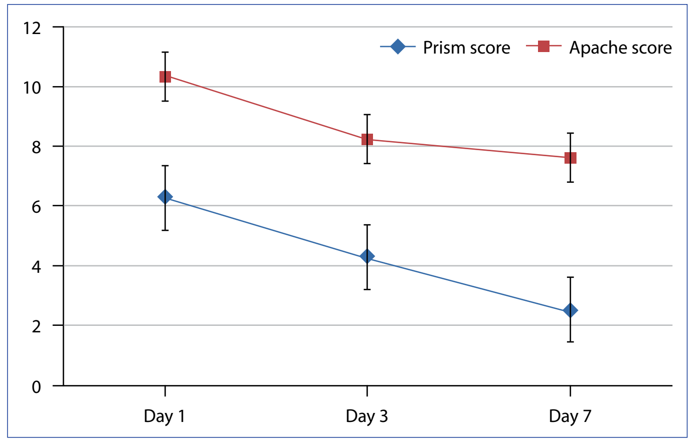

Figure 1. Distribution of the scoring systems of the survivors and the exitus patients as per days.

Prism: Pediatric Risk of Mortality; Apache: Acute Physiology and Chronic Health Evaluation.

The correlation analysis performed to establish the relationship between the modified APACHE score on day 7 and the mechanical ventilation time revealed no statistically significant relationship between the scores (r=-0.045; p=0.688) (Table 4).

No significant relationship was found between the mechanical ventilation time and change in the PRISM score from day 1 to day 3, change in the PRISM score from day 3 to day 7 (p=0.199 and p=0.914, respectively), change in the modified APACHE score from day 1 to day 3, and change in the modified APACHE score from day 3 to day 7 (p=0.266 and p=0.220, respectively) (Table 4).

The PRISM scores on day 1 and on day 3 of the exitus patients were significantly higher than those of the survivors (p<0.001 and p=0.049, respectively). No statistically significant difference was found between the exitus patients and survivors with respect to the PRISM score on day 7 (p=0.763) (Fig. 1 and Table 5).

No statistically significant difference was found between the exitus patients and survivors with respect to the mod-

Table 5. Relationship between mortality and the scores (values are presented as mean±SD)

	Survivor		p
	Mean±SD	Mean±SD	
PRISM score on day 1	5.931±3.019	8.714±3.989	**0.002****
PRISM score on day 3	4.139±3.040	6.667±3.011	**0.049***
PRISM score on day 7	2.532±2.358	2.200±2.683	0.763
APACHE score on day 1	10.216±2.387	11.143±1.703	0.163
APACHE score on day 3	8.198±2.735	8.667±2.066	0.681
APACHE score on day 7	7.570±1.831	8.000±2.828	0.623

*p<0.05; **p<0.01. SD: Standard deviation; PRISM: Pediatric Risk of Mortality; APACHE: Acute Physiology and Chronic Health Evaluation.

ified APACHE score on days 1, 3, and 7 (p=0.163, p=0.681, and p=0.623, respectively) (Fig. 1 and Table 5).

No statistically significant difference was found between the exitus patients and survivors in terms of change in the PRISM score from day 1 to day 3 and from day 3 to day 7 (p=0.831 and p=0.232, respectively), and the change in the modified APACHE score from day 1 to day 3 and from day 3 to day 7 (p=0.964 and p=0.761, respectively).

The reason for the difference between the number of patients in the tables is due to the decrease in the number of patients due to mortality between 0 and 7 days.

Discussion

The diseases causing hospitalization in the pediatric intensive care unit (PICU) may vary according to the patient group under service. Although the studies performed by Arias et al.[3] and Khilnani et al.[4] have suggested respiratory system disorders as the most important reason of hospitalization in PICUs, certain studies have shown that the primary reason of hospitalization is congenital heart disease.[5,6] In this particular study, the post-operative risk of the heart surgeries in newborns has been evaluated.

The systems for determining the risk of mortality in the PICU have proved to be a standardization method in the comparison of the intensive cares and, much more of clinical importance, they are used to make sure the patients at high risk are separated from the patients at low risk, ensuring that the intensive care is directed to patients who need it for real. The cost rate per 24-hour inpatient in pediatric ICU increases as the number of experienced personnel decreases and the number of inpatients increases. Considering this situation, the importance of scoring systems increases. Being the main systems that are used for this purpose nowadays, APACHE-II and APACHE-III systems are based on the data obtained from adult patients staying in the ICUs. Being used for the pediatric and infantile patients, the PRISM and modified APACHE score have also been prepared based on the pediatric intensive care patients and an effort was made to use simple and non-invasive values such as the APACHE-II score, in particular.

This particular study has determined that, unlike as stated in the literature, the predictivity of the PRISM score is low particularly for the post-operative day 3 and the APACHE score is significantly high for the post-operative day 1. Although the low (0-5) scores show low mortality correctly, the moderate (5-12) values do not allow for an estimation about mortality. Due to the fact that the APACHE II score is based on the adult values, a high ratio of wrong positive results is obtained in the infantile and pediatric age groups whose respiratory frequency and pulse rate are physiologically higher and whose total daily urine volume and average arterial pressure are physiologically lower than those of the adults and majority of the patients are considered in the high-risk group.

This study has determined an extremely high predictivity potential when a more detailed and precise scoring system, APACHE-III, was used by modifying the four parameters mentioned above. However, this scoring has also given some false results as it, like the other ones, does not take the effects of the open heart surgery into consideration. When the reason of this mistake was reviewed, the modified scores gave normal results in these patients as in the whole population. However, it is suggested that particularly massive transfusion and resulting hemolysis may be the main source of problem.

Significant complications that affect the results may develop during the patient follow-up in the ICU. Studies have indicated a relationship between mortality and the change in the hematological parameters, arrhythmias, renal failure, and hospital infections.[7,8]

The mortality ratio in the ICUs may vary between the countries and by age.[9] The mortality ratio in the ICUs is in the range of 17-36.2% in adults, whereas in the range of 4.7-19% in children.[9] Studies have demonstrated that mortality is correlated with the invasive interventions, pneumonia, use of more than 2 antibiotics, multiple organ failure, sepsis, and septic shock.[10] The mortality ratio was 17.7% in this study.

PRISM III is the most commonly used scoring system for the estimation of mortality in the ICUs and consists of 17 clinical and laboratory variables.[11] The reliability of this scoring system in the estimation of mortality has been backed up by the studies conducted in the United States and Europe.[12,13] Yogaraj et al.[6] have indicated a relationship between the PRISM III score and blood culture positivity. It is reported in the literature that a PRISM III score higher than 13-15 is a reliable parameter in the estimation of mortality.[14,15] The possibility of the estimation of mortality by the PRISM score on the post-operative 1st and 3rd days was statistically significant in this study. However, no statistical relationship could be established between the PRISM scores on the post-operative 7th day and the estimation of mortality. The results demonstrate that the PRISM scoring system is effective in the estimation of mortality for the first 3 post-operative days. Nevertheless, the modified APACHE scoring was not shown to be effective in the estimation of mortality on the post-operative 1st, 3rd, and 7th days.

A study performed by Bellad et al.[16] in 203 patients in the PICU has demonstrated that the PRISM score is well correlated with the mortality and the length of hospital stay as well as the number of organ failures and that it has high sensitivity.

In addition, Roshani et al.[17] have compared the PRISM and PIM scoring in 230 patients in the PICU. The success of the PRISM scoring in the estimation of mortality was found significantly higher than that of the PIM scoring.

Tibby et al.[18] compared the PIM, PRISM, and PRISM II scoring in 928 patients in the PICU and reported PIM as the most appropriate scoring in the estimation of mortality in these patients.

The studies mentioned above were conducted in general PICUs. Cho et al.[19] demonstrated in a study that the APACHE III and II scores could not substitute the Glasgow Coma Scale in the evaluation of 200 patients who were taken into the ICU due to acute head trauma. However, APACHE III was shown to have higher predictivity values than the other two scoring systems in the determination of late-stage mortality. Del Bufalo et al.[20] performed a study in patients in the chest diseases ICU and determined that the predictivity of APACHE II scoring system was significantly higher than that of Simplified Acute Physiology Score.

In the literature studies, no comparison of modified APACHE and PRISM scoring systems was encountered on patients who were taken into the PICU following congenital heart surgery.

In this particular study, when the extubation time, length of ICU stay, and mechanical ventilation time were compared, it was found that the above-mentioned durations of the patients with high modified APACHE and PRISM scores on the post-operative day 1 were also long. While the modified APACHE scoring did not have a such correlation on the post-operative 3rd and 7th days, it was determined that the extubation and mechanical ventilation times of patients with high PRISM score on the post-operative 3rd day were also long. In addition, the mortality was found significantly high in patients with high PRISM score on the post-operative 1st and 3rd days, whereas no such correlation was found for the modified APACHE scoring on the post-operative 1st, 3rd, and 7th days.

The weak point of the study presented is the small number of patients due to the retrospective and single-center design of the investigation. However, the results obtained are important to determine the present status and to provide a better point of view for the future.

Conclusion

It is harder to identify the need of intensive care in pediatric patients as compared to the adults. A completely effective mortality evaluation system has still not been developed for the pediatric post-operative intensive care.

The modified APACHE scoring system obtained by the modification of the cardiopulmonary parameters of the APACHE-III scoring used for the adult patients has a low predictivity potential in the cases of pediatric open heart surgery. This system should be modified considering the conditions of open heart surgery. In consequence, the PRISM score is an important indicator in estimating the mortality in our ICU as in the literature. Further multicenter studies in more patient groups are required to do planning to improve the treatment services and results in PICUs throughout the country.

Disclosures

Ethics Committee Approval: The study was approved by The Dr. Siyami Ersek Thoracic and Cardiovascular Surgery Training and Research Hospital Ethics Committee (Date: 19/04/2011, No: E-542).

Informed Consent: Written informed consent was obtained from all patients.

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