APPLICATION STUDY OF FIVE DIFFERENT SCORING SYSTEMS FOR ASSESSMENT OF ILLNESS SEVERITY AND THEIR RELATION TO PATIENTS OUTCOME AT PEDIATRIC INTENSIVE CARE UNIT OF BAB EL-SHA'REYA UNIVERSITY HOSPITAL

Mohsen Taha El-keiy*, Hesham Ahmed M. Aly*, Kamel Soliman Hammad, Bassam Essam E. Mohamed***

Pediatrics* and clinical pathology** Department, Faculty of medicine, Al-Azhar University

ABSTRACT

Background: Little is known about the exact causes of death and the impact of general risk factors that may complicate the course of critically ill patients, different scoring systems used for assessment illness severity and outcome in ICU patients. **Objectives:** Application of commonly used scores for assessment of illness severity and determine their relation to patient outcome. And identify the combination of factors capable of predicting patient's outcome. **Patients and Methods:** This study included 100 patients who enrolled in a prospective observational cohort study. All were admit to pediatric ICU in Bab El-Sha'reya University Hospital over a period of 8 months duration (from January to August 2016). Pediatric Risk of Mortality (PRISM) III, Pediatric Multiple Organ Dysfunction (PEMOD) scoring system, Pediatric Logistic Organ, Dysfunction(PELOD) scoring system**,** Pediatric Index of Mortality 2 (PIM2)**,** Sepsis-related Organ Failure Assessment (SOFA) score were obtained for every patient within the day of admission and patients were evaluated on follow up using SOFA score. Each score parameter was evaluated separately. **Results:** Significant positive correlations were found between PRISM III, PIM2, PELOD, PEMOD and SOFA on the day of admission and mortalities of PICU. SOFA score had the highest discrimination ability (area under ROC curve: 0.765). Significant positive correlations were found between SOFA on day 1, 3 and 7 and mortalities of PICU. Other factors that increased risk of mortality were longer length of stay, mechanical ventilation and dialysis. **Conclusion:** Scoring systems applied in our PICU had good discrimination ability. PIM2 score discriminated well between survival and non-survival at our PICU. PELOD score can measure the severity of organs dysfunction and significantly correlated to mortalities in our PICU. SOFA score was a good tool for following up patients. Length of stay, use of mechanical ventilation and dialysis were risk factors of mortality. Patients admitted with MODS had highest mortality rates.

Keywords: Scoring systems - Pediatric intensive care unit- Mortality rate- Critical care-illness severity- multiple organ dysfunction.

INTRODUCTION

One pediatric population of special interest is critically ill children requiring intensive care services, since these children are at an increased risk of death ***(Lopez et al., 2006).*** Intensive care medicine has developed into a highly specialized discipline covering several fields of medicine. Whereas the total number of hospital beds in the United States decreased by 26.4% from the year 1985 to 2000, intensive care unit (ICU) beds increased by 26.2% during the same period, underlining the high demand for intensive care medicine ***(Halpern et al., 2004).***

Mortality rates in the ICU strongly depend on the severity of illness and the patient population analyzed, and 6.4% to 40% of critically ill patients were reported to die ***(Azoulay et al., 2003).***

Although patho-physiological processes and new treatment approaches are extensively analyzed in laboratory and clinical research, comparably less data are available on the causes of death, short- and long-term outcomes of critically ill patients, and associated risk factors ***(Arabi et al., 2004).*** Mostly, data on specific prognostic criteria for single diseases have been published ***(Bernieh et al., 2004).*** However, little is known of the exact causes of death and the impact of general risk factors that may uniformly complicate the course of critically ill patients irrespective of the underlying disease ***(Khouli et al., 2005).***

Knowledge of such general determinants of outcome in a critically ill patient population would not only help improve prognostic evaluation of ICU patients, but also indicate what therapy and research should focus on to improve the short and long term outcomes of critically ill patients ***(Chang et al., 2006).***

Scoring systems for use in ICU patients have been introduced and developed over the last 30 years. They allow an assessment of the severity of disease and provide an estimate of in-hospital mortality. This estimate is achieved by collating routinely measured data specific to a patient. Weighing is applied to each variable, and the sum of the weighed individual scores produces the severity score ***(Le Gall, 2005).***

Scoring systems such as the Pediatric Risk of Mortality (PRISM) III score and Pediatric Index of Mortality 2 (PIM2) are widely used in pediatric intensive care. These are third generation

scoring systems that allow assessment of the severity of illness and mortality risk adjustment in heterogeneous groups of patients in an objective manner, enabling conversion of these numbers into a numerical mortality risk based on logistic regression analysis ***(Van Keulen et al., 2005).***

This study was designed to:

- Describe the profile of patients admitted to PICU in terms of underlying condition, system failure, as well as the supportive services provided.
- Apply commonly used scores for assessment of illness severity and determine their relation to patient's outcome.

Identify the combination of factors capable of predicting patient's outcome.

PATIENTS AND METHODS

One hundred patients were enrolled in a prospective observational cohort study. All were admit to pediatric ICU in Bab El-Sha'reya University Hospital over a period of 8 months duration (from January to August 2016).

The ethical committee of Faculty of Medicine, Al-Azhar University approved this study. Approval of the parents was obtained by a written consent.

Inclusion criteria: One hundred patients admitted to our PICU aged 1 month up to 14 years old.

Exclusion criteria:

1. Patients below the age of 1 month and those above 14 years.
2. Patients died or discharged in the first 24 hours after admission to our PICU.

Intervention: Complete medical history and clinical examination and full investigations included: complete blood count (CBC), arterial blood gases (ABG), full chemistry, renal function, electrolytes and coagulation profile.

Assessment of the severity of illness and mortality risk adjustment on admission of the patient using the parameters of the following scores:

- Pediatric Risk of Mortality (PRISM) III ***(Pollack et al., 1996).***
- Pediatric Multiple Organ Dysfunction (PEMOD) scoring system ***(Leteurtre et al., 1999)***.
- Pediatric Logistic Organ Dysfunction (PELOD) scoring system ***(Leteurtre et al., 1999)***.
- Pediatric Index of Mortality 2 (PIM2) ***(Slater et al., 2003).***

- Sepsis-related Organ Failure Assessment (SOFA) score ***(Vincent et al., 1996).***

The length of stay in PICU was recorded. The patients were followed-up throughout their stay in PICU to record their final outcome. The final outcome was recorded as "discharged" or "death."

Statistical analysis: Results were tabulated and statistical significance was tested using SPSS version 22 and the student-t test for quantitative values and Chi-square-test (X^2): test for statistical significant relation between different variable or grades in qualitative data for comparison of qualitative data**.**

RESULTS

One hundred patients were enrolled in a prospective observational cohort study. Age of studied patients ranged from 1.5 months to 159 months. Forty-six (46%) were females and 54 (54%) were males.

Table (1): Distribution of patients according to sex and age.

Sex	**Survived**		**Died**		**Total**	
	n	**%**	**n**	**%**	**n**	**%**
Male	42	(77.77%)*	12	(22.23%)*	54	(54%)**
Female	26	(56.6%)*	20	(43.4%)*	46	(46%)**
Age						
1m to 2m	8	(88.9%)*	1	(11.1%)*	9	(9%)**
>2m to 12m	35	(62.5%)*	21	(37.5%)*	56	(56%)**
>12m	25	(71.5%)*	10	(28.5%)*	35	(35%)**
Mean age (m)	22.4		17.1			
Standard deviation	±25.1		±16.4			
Total	68	(68%)**	32	(32%)**	100	(100%)

n. number of patient * % within group ** % of total

Table (1) shows 46 (46%) were females and 54 (54%) were males, deaths in both sexes were (43.4% and 22.23% respectively) and shows that percentage of deaths as an outcome was higher in age group (>2m to

12m). Total survived were 68 (68%) patients and total died patient were 32 (32%).

Table (2): Diagnoses of Patients on Admission and their Risk of Mortality.

Diagnosis	Patients n (%)	Deaths (%)	Odds ratio	Sensitivity (%)	Specificity (%)
Respiratory[1]	27 (27%)	7 (25.9%)	0.24	18.33	51.46
CVS[2]	1 (1%)	0 (0%)	0	0	89.47
Both[3]	6 (6%)	2 (33.3%)	2.97	18.33	92.98
CNS[4]	25 (25%)	10 (40%)	3.88	30	90.06
GIT[5]	8 (8%)	1 (12.5%)	0.56	3.33	94.15
Metabolic[6]	4 (4%)	2 (50%)	2.88	1.67	99.42
Sepsis & MODS[7]	6 (2.5%)	4 (66.67%)	6.04	6.67	98.83
Hepatic[8]	3 (1.2%)	1 (33.33%)	1.43	1.67	98.83
Kidney[9]	5 (2.1%)	2 (40%)	1.93	3.33	98.25
Endocrine[10]	7 (7%)	0 (0%)	0	0	95.32
Others[11]	3 (1.3%)	1 (33.3%)	1.43	1.67	98.83
After procedure[12]	5 (7%)	2 (40%)	0.31	1.67	94.74

(1)Respiratory problems: bronchial asthma, croup, bronchopneumonia, pneumonia, bronchiolitis, laryngiotrachiobronchitis, pleural effusion. (2)Cardiovascular diseases: CHD complicated with heart failure, pericardial effusion, myocarditis and cardiomyopathy. (3)Both CVS and respiratory tract infection: CHD complicated by heart failure & chest infection. (4)CNS diseases: disturbed conscious level for differential diagnosis, encephalitis, acute disseminated encephalomyelitis, intracranial hemorrhage, status epilipticus, convulsions, neurodegenerative disease, myopathy and guillian barre syndrome. (5)GIT diseases: gastroenteritis. (6)metabolic disease: phenyl ketonuria and intractable metabolic acidosis for differential diagnosis. (7)Septicemia & MODS.. (8)Hepatic disease: hepatitis A virus and acute hepatic failure. (9)Kidney diseases: HUS, RTA, CRF and poly-cyctic kidney disease. (10)Endocrine: DKA. (11)Other causes for admission: motor car accident, fall from height . (12)After procedure: bronchoscope or other surgical operation.

Table (2) shows the highest admission diagnoses were respiratory system diseases (27%), central nervous system affection (25%) and gastrointestinal diseases (8%) but the highest mortality rates were among

patients with septicemia and multiple organ dysfunction syndrome (MODS 66.7%).

Table (3): Scores Done for the Patients on Admission.

Variable / Score	Outcome	Mean	SD	p value	AUC
PRISM III	Died	22.9	±9.27	P<0.0001	0.751
	Survived	6.73	±4.86		
PIM2	Died	0.4367	±0.29	P<0.0001	0.747
	Survived	0.0712	±0.10		
PEMOD	Died	7.05	±3.88	P<0.0001	0.732
	Survived	4.13	±2.82		
PELOD	Died	24.17	±14.25	P<0.0001	0.762
	Survived	8.96	±8.31		
SOFA	Died	4.4	±2.98	P<0.0001	0.765
	Survived	1.52	±2.08		

AUC: area under the curve.

Table (3) show significant positive correlations were found between PRISM III, PIM2, PELOD and PEMOD on the day of admission and mortalities ($p < 0.0001$). SOFA score had the highest discrimination ability (area under ROC curve: 0.765).

In our study PELOD score was significantly higher in non-survivors than in survivors {mean 24.1 vs 8.96 respectively} and there was significant correlation between the score and mortalities as an outcome of PICU ($p<0.0001$), with acceptable discrimination ability (area under ROC curve 0.732).

Table (4): Relation Between the Number of Organ Dysfunctions, PELOD Score and Mortality.

Number of Organ Dysfunctions	Patients n. (%)	Mean PELOD score	Deaths n (%)
0	5 (5%)**	0	0 (0%)*
1	8 (8%)**	6.7	2 (25%)*
2	33 (33%)**	11.3	8 (24.24%)*
3	32 (32%)**	16.6	12 (37.5%)*
4	15 (15%)**	24.8	6 (40%)*
5	5 (5%)**	29.1	2 (40%)*
6	2 (2%)**	33.5	2 (100%)*

n number of patient * % within group ** % of total

Table (4) show the mortality was directly proportional to the degree of organ dysfunction and the PELOD score also increased with number of organ dysfunction.

Forty-three percent of our patients needed mechanical ventilation and 74.4% died, the risk of mortality was high in patients who were mechanically ventilated.

We found also patients who needed dialysis either peritoneal or hemo-dialysis were at high risk of mortality.

Table (5): Correlation between Deaths number versus Predicted Death rate by PIM2 score in the study patients.

Variables / Patients	n	(%)	Non-survivors				Mean PIM2 score	SMR (O/P) (95% CI)	P value
			Deaths n.	(%)	Predicted n.	(%)			
All patients	100	(100%)	32	(32%)	58	(58%)	0.5079	0.55 (1.29–2.76)	0.01
Age (months)									
1m to 2m	9	(9%)	1	(11.1%)	4	(44.45%)	0.2944	0.25(1.12-2.71)	0.02
>2m to 12m	56	(56%)	21	(33%)	36	(64.2%)	0.66	0.58 (0.99–2.86)	0.05
>12	35	(35%)	10	(28.5%)	18	(51.4%)	0.389	0.55 (0.90–2.70)	0.09
Sex									
Male	54	(54%)	12	(22.23%)	20	(37.03%)	0.2161	0.6 (0.72-2.39)	0.04
Females	46	(46%)	20	(43.4%)	38	(82.6%)	1.747	0.53(1.18–3.17)	0.01

Table (6): Correlation between Deaths number versus Predicted Death rate by PIM2 score in the study patients according to systems affection.

Variables / Diagnosis	n	(%)	Non-survivors				Mean PIM2 score	SMR (O/P) (95% CI)	P value
			Deaths n.	(%)	Predicted n.	(%)			
Respiratory	27	(27%)	7	(25.9%)	13	(48.14%)	0.3415	0.053 (1.46-5.5)	0.04
CVS	1	(1%)	0	(0%)	1	(100%)	0.621	0 (0.45–0.77)	0.05
Both	6	(6%)	2	(33.3%)	4	(66.67%)	0.736	0.5 (0.72–2.54)	0.026
CNS	25	(25%)	10	(40%)	12	(48%)	0.3401	0.83 (0.38–4.08)	0.046
GIT	8	(8%)	1	(12.5%)	6	(75%)	1.104	0.167 (0.42-3.1)	0.002
Metabolic	4	(4%)	2	(50%)	3	(75%)	1.104	0.67 (0.58-2.34)	0.021
Sepsis & MODS	6	(2.5%)	4	(66.67%)	6	(100%)	0.523	0.67 (0.59-3.42)	0.025
Hepatic	3	(1.2%)	1	(33.33%)	2	(66.67%)	0.736	0.5 (0.72-2.34)	0.026
Kidney	5	(2.1%)	2	(40%)	3	(60%)	0.552	0.67 (0.57-2.45)	0.027
Endocrine	7	(7%)	0	(0%)	3	(42.86%)	0.2760	0 (0.45–0.77)	0.01
Others	3	(1.3%)	1	(33.3%)	2	(66.67%)	0.736	0.5 (0.74-2.44)	0.023
After procedure	5	(7%)	2	(40%)	3	(60%)	0.552	0.67 (0.56-2.33)	0.03

Correlation is significant at the p value 0.05 level, (SMR) Standardized mortality ratio, (CI) Conditional independence

Table (5) and Table (6) show the observed mortality rate was 32% and PIM2 predicted mortality rate was 58% with Standardized mortality ratio (SMR) = 0.55 (95% CI 1.29–2.76).

Table (7): Correlation between outcome of patients and SOFA score on day 1, 3 & 7.

	Outcome	**Mean**	**SD**	**p value**
SOFA d1	Died	4.4	±2.98	**P<0.0001**
	Survived	1.52	±2.08	
SOFA d3	Died	5.2	±3.00	**P<0.0001**
	Survived	1.03	±1.68	
SOFA d7	Died	5.9	±3.22	**P<0.0001**
	Survived	0.74	±1.29	

Correlation is significant at the p value 0.05 level.

Table (7) show significant positive correlations were found between SOFA on day 1, 3 and 7 and mortalities of PICU ($p<0.0001$).

Table (8): Correlation between Length of stay and outcome.

	Outcome	Mean (days)	SD	p value
Length of stay	Died	16.5	±24.9	**0.004**
	Survived	6.8	±5.9	

Correlation is significant at the p value 0.05 level.

Table (8) show significant relation between length of stay and deaths as an outcome of PICU was found ($p=0.004$). The mean length of stay in our study was 6.8±5.9 days for survivors and 16.5± 24.9 days for non-survivors.

Table (9): Correlation between metabolic respiratory disorders on admission and outcome.

	Outcome	Mean	SD	p value
PaO_2	Died	106.3	±51.7	0.23
	Survived	115.4	±44.2	
FiO_2	Died	74.0	±28.2	0.26
	Survived	69.1	±29.0	
PaO_2/FiO_2ratio	Died	184.1	±167.8	0.21
	Survived	211.6	±137.0	
PIM2 score $100/(PaO_2/FiO_2)$	Died	0.9	±0.7	**0.01**
	Survived	0.7	±0.4	
$PaCO_2$	Died	37.7	±18.9	0.35
	Survived	34.9	±20.9	
Total CO_2	Died	131.9	±20.1	0.33
	Survived	135.4	±27.5	
PH	Died	7.3	±0.2	**0.001**
	Survived	7.4	±0.1	
base deficiency	Died	8.0	±11.9	0.08
	Survived	5.2	±6.1	
Bicarbonate	Died	18.8	±8.6	0.11
	Survived	20.8	±8.7	

Correlation is significant at the p value 0.05 level.

Table (9) show that there was strong correlation between respiratory dysfunction, quantified using 100/ (PaO2/FiO2 ratio) and acidosis, and the PICU mortality. But we found no significant correlation between respiratory dysfunction, quantified using PaO2/FiO2 ratio, and the PICU mortality.

DISCUSSION

This results appear relatively high and may be due to the limited number of beds in our ICU, only the sickest children may have been admitted to the ICU. In addition, the referral nature of our hospital may lead to selection of more critically ill children.

Regarding age of admission our results were in concordance with a study done in the PICU of El-Shatby Children's Hospital in Alexandria found that the mean age of survivors was significantly higher than non-survivors (23 ± 31 vs. 13 ± 23 months, respectively) ***(El-Nawawy et al, 2003)***.

Regarding the admission diagnoses our results were in concordance with a study done in Barbados, respiratory illnesses (33%) were the most common diagnoses on admission followed by neurological (22%) ***(Hariharan et al, 2011).*** In a large study in UK, data collected from 18 PICUs, the 3 most common reasons for admissions were bronchiolitis (8.6%), status epilepticus or uncontrolled seizure (8.6%), and primary brain injury (4.4%) ***(Brady et al, 2006).***

In concordance with our results ***(Typpo et al., 2009)*** and **(Costa et al., 2010)** demonstrated that the presence of MODS on the first day of hospitalization was related to higher mortality.

In our study the observed mortality rate was 32% and PIM2 predicted mortality rate was 58% with SMR = 0.55, ***Hariharan et al., 2011*** conducted in Barbados found a similar result the observed mortality was found to be 25.5%; lower than the PIM2 predicted mortality (46.2%), SMR is 0.89.

The mean PRISM III was higher in non-survivors than in survivors (22.9±9.2 & 6.7±4.8 respectively), a study done by ***El-Nawawy and colleagues, 2003*** in Alexandria found a similar result that the mortality rate was positively correlated with a high PRISM III score. In contrast some authors have shown that the PRISM score overestimated mortality***(Espuñes et al, 2007; Eulmesekian et al, 2006).***

In our study, PIM2 score on day of admission showed significant correlation with mortality as an outcome of PICU ($p<0.0001$) with acceptable discrimination ability (area under ROC curve 0.747). In agreement with our results, a study done by ***Hariharan and colleagues, 2011*** found that PIM2 scoring system calibrated well and had a reasonable discriminatory ability.

In our study PELOD score was significantly higher in non-survivors than in survivors {mean 24.1 vs 8.96 respectively} and there was significant correlation between the score and mortalities as an outcome of PICU ($p<0.0001$), and the mortality was directly proportional to the degree of organ dysfunction and the PELOD score also increased with number of organ dysfunction.

Similarly, another study found that the risk of mortality was directly proportional to the degree of organ dysfunction and PELOD score increased with the number of organ dysfunction ***(Garcia and colleagues, 2010)***.

The mean PEMOD was higher in non-survivors than in survivors (mean 7.05±3.88, 4.13±2.82 respectively). Our results were in consistent with ***Graciano and colleagues, 2005*** from Dallas as they found progressive increases in PEMOD score yielded stepwise increases in overall mortality rate.

In the present study we found positive correlation between SOFA score on the day of admission and mortalities as an outcome ($p<0.0001$) with acceptable discrimination ability (area under ROC curve 0.765).

On the contrary to our results in Australia, ***Ho and colleagues, 2007*** found no significant relation between SOFA on the day of admission and mortality ($p=0.437$). May be this differences were due to high mortality rate in our patients from sepsis.

The mean length of stay in our study was 6.8±5.9 days for survivors and 16.5± 24.9 days for non-survivors. Significant relation between length of stay and deaths as an outcome of PICU was found ($p=0.004$). Similarly, in a study by ***Costa and colleagues, 2010*** found that length of stay was significantly a relevant risk factor for death ($p<0.0001$).

Two studies found that the mean LOS was longer in non-survivors when compared with survivors, but with no statistical significance between LOS and mortalities ***(Hariharan and colleagues, 2011***., ***Bilan and colleagues, 2009)***

Graciano and colleagues, 2005 study was similar to our results regarding the absence of relation between bilirubin and mortality rate; and the presence of positive correlation between BUN and mortality rate.

CONCLUSION

- PRISM III, PIM2, PELOD, PEMOD and SOFA scores applied in our PICU were

significantly correlated to mortalities as PICU outcome.

- PIM2 score discriminated well between survival and non-survival at our PICU.
- PIM2 is easily calculated and is freely available, thus provides a good incentive for ICU settings in Egypt for admission of high risk patients in the light of the limited PICU bed complement capacity in relation to the demands.
- PELOD score can measure the severity of organs dysfunction and significantly correlated to mortalities in our PICU.
- SOFA score was a good tool for following up patients and predicting mortalities of PICU.
- Interventions have an impact on outcome, despite higher predicted death rate.
- Mortality risk adjustment at earliest part of patient management, this will be very useful in counseling of parents
- Prolonged length of stay and use of mechanical ventilation and patient on dialysis were high risk of mortality.
- Patients admitted with MODS had highest mortality rates.

RECOMMENDATIONS

- The use of PRISM III score PIM2 score in PICU for evaluating the patients on admission and predicting risk of mortality.
- The use of PELOD score to evaluate organ dysfunction in any child admitted to PICU.
- The use of SOFA score can be enough for follow up.
- Apply this study on a larger scale and different PICUs to compare with our results, and to include all different medical Pediatric illnesses.
- We recommend to gather different important risk factors in a new score including PaO2/FiO2, use of mechanical ventilation, GCS, papillary reflex, pH, K level, serum Ca, bilirubin level, PT, PTT and albumin.

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تطبيق دراسة خمسة نُظم مختلفة لتقييم شدة المرض وعلاقتها بنتائج المرضى فى وحدة الرعاية المركزة للأطفال بمستشفي باب الشعرية الجامعي

محسن طه القيعي* - هشام احمد محمد علي* - كامل سليمان حماد
بسام عصام الدين محمد***

قسمى طب الأطفال* والباثولوجيا الإكلينيكية - كلية الطب - جامعة الازهر**

طب الحالات الحرجة تطور في الآونة الأخيرة وقد تم نشر بيانات على معايير محددة تنذر بخطورة الموت لأمراض عده ومع ذلك، لا يعرف إلا القليل من الأسباب الحقيقية للوفاة، وتأثير عوامل الخطر العامة التي قد تدهور حالة المريض أثناء مكوثه بالرعاية بغض النظر عن الأمراض الكامنة . نظم تقييم الاطفال لا تساعد فقط على تحسين التقييم للمرضى فى وحدة العناية المركزة، ولكن تبين أيضا ما العلاج والبحث الذى يجب أن نركز عليه لتحسين النتائج قصيرة وطويلة المدى من المرضى المصابين بأمراض خطرة.

تم تسجيل مائة مريض في هذه الدراسة بوحدة العناية المركزة للأطفال بمستشفي باب الشعرية الجامعي على مدى ثمانية اشهر. وتم تسجيل التاريخ المرضى لجميع المرضى والفحص الاكلينيكي الدقيق. و تم الحصول على تقييم لنظم طبية مختلفة تنذر بحالات الوفاة تكتب اختصاراتها كالآتي PRISM III ، PIM2، PEMOD، SOFA وPELOD لكل مريض خلال اليوم الاول من القبول و يستخدم النظام الذي يكتب اختصاره كالآتي SOFA لمتابعة المرضي. وأظهرت النتائج أن معدل وفيات الأطفال كان 32٪. وكانت معدلات الوفيات فى الرضع أعلى مما كانت عليه في الأطفال. وكانت أعلى معدلات التشخيص، المشاكل في الجهاز التنفسي (27٪)، تليها الجهاز العصبي (25٪)، الجهاز الهضمي (8٪)، ولكن أعلى نسبة من الوفيات كانت في المرضى الذين يعانون من مرض تسمم الدم و فشل في عدة اجهزة (66٪) .

تم العثور على الارتباط احصائي إيجابي ذا دلالة إحصائية هامة بين النظم المنذرة لحالات الوفاة (PRISM III، PIM2، PELOD وPEMOD) التي تم عملها في اليوم الأول لدخول المرضي وبين حدوث حالات وفاة بالفعل وبالأخص نظام PIM2. كما تم العثور على ارتباطات إيجابية ذات دلالة إحصائية بين SOFA في يوم 1 و 3 و 7 والوفيات. كان هناك ارتباط كبير بين طول مدة الإقامة و SOFA يوم القبول، ويوم 1 و يوم 3. والعلاقة الإيجابية بين طول مدة الاقامة و الوفيات.

هناك خطر من ارتفاع معدلات الوفيات فى المرضى الذين تتطلب حاجتهم استخدام التنفس الصناعي و فى المرضى الذين يحتاجون إلى الغسيل الكلوي.