VALIDITY OF LACTATE CLEARANCE VERSUS PEDIATRIC RISK OF MORTALITY (PRISM) SCORE III AND PEDIATRIC INDEX OF MORTALITY (PIM) SCORE 3 IN PREDICTION OF MORTALITY IN PICU

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ABSTRACT

Objective: *to determine whether lactate clearance in the early period of resuscitation help predict mortality in pediatric intensive care unit and to compare it with the performance of the new risk of mortality (PIM 3) and PRISM III to predict actual mortality among patients in PICU in Al -Azhar University Hospitals (El Hussein &Bab El Sheria).*

Subjects and Methods: *A prospective observational study was conducted on 100 children of both sexes admitted to Pediatric Intensive Care Unit (PICU) of Al -Azhar University Hospitals, pediatric department (El Hussein &Bab El Sheria). They were selected by simple random method. This study was carried out during the period of December 2017 to December 2018. Full history, routine, physical examination and special investigations were taking.*

Results: *Lactate Clearance, PRISM III and PIM 3 score, showed a receiver-operating-characteristics area under the curve (ROC-AUC) value of 0.974, 0.971 and 0.941 respectively to predict PICU mortality (cut-off showing highest sensitivity was 24 hours Lactate Clearance of 15.4%, PIM 3 Score of 33.3, and PRISM III of 16 and specificity was 87.5%, 87.5% and 75% for each respectively.*

Conclusions: *PRISM III and PIM 3 scoring systems shows adequate discriminatory function and well calibrated for the case mix of patients in PICU of Al Azhar University hospitals. It can be used as a beneficial tool for evaluation of risk adjusted mortality. Lactate clearance showed higher sensitivity and specificity than PRISM III and PIM 3 so serum lactate level should be used as one of the first laboratory orders to be measured to all cases admitted at pediatric intensive care unit at admission and after 24 hours followed by calculation of lactate clearance.*

Key words: *Intensive Care Unit, Lactate Clearance, PIM, Prediction, PRISM III score.*

INTRODUCTION

Scoring systems are means of quantifying clinical states that are difficult to summarize by other subjective or objective means. These systems are especially valuable in the ICU where subjective impressions of clinical states, severity of illness and risk of mortality are highly variable **(Zheng et al., 2020)**.

Diverse scoring systems have been developed for all age groups including pediatric. Mortality is the most frequently assessed outcome. These scores have been developed not to predict the outcome of individual patient, but as tools for assessing the performance of intensive care units relative to other units, to outcome measure, and/or to enrollment criteria in clinical trials. **(Singer et al., 2016)** The principle scores that have been developed for the pediatric population are the PRISM (pediatric risk of mortality) and PIM (pediatric index of mortality), with their most recent versions being PRISM III and PIM 3. These scores were developed by identifying variables relevant to mortality risk and scoring them after a multivariate statistical analysis by logistic regression. **(Leclerc et al., 2017)** The new PIM 3 score was developed to improve mortality prediction when compared with PIM 2, which had a tendency to over predict deaths. **(Wolfler et al., 2016)** When choosing whether to use PIM or PRISM, it is important to note that PIM 3 uses data available at the time of admission, whereas PRISM uses the worst value of physiological variables collected over the first 12 hours **(Tugay et al., 2019)**.

Blood lactate levels are used in several situations, such as marker for tissue hypo perfusion in shock patients, indicator of adequate post-shock resuscitation, prognostic index after resuscitation, prognostic factor in case of severe diseases and as etiologic diagnosis. **(Malbrain et al., 2018)** Single lactate level, particularly those measured on Intensive Care Unit (ICU) entry or arrival at the emergency department (ED), has been thought to be a strong predictor of subsequent organ dysfunction and mortality. **(April et al., 2017)** The predictive value of initial lactate has been confirmed in several large cohort or database studies. However, a single measurement of lactate is a static variable and can only serve as a risk-stratification biomarker. Serial measurements or lactate clearance (LC) over time may be better prognosticators of organ failure and mortality than a

single lactate measurement **(Tulli, 2019)**.

AIM OF THE WORK

The aim of this study was to evaluate whether lactate clearance in the early period of resuscitation help predict mortality in pediatric intensive care unit and to compare it with the performance of the new risk of mortality (PIM 3) and the PRISM III to predict actual mortality among patients in PICU in Al -Azhar University Hospitals (El Hussein & Bab El Sheria).

Ethical consideration:

Written informed consent was obtained from parents or local gardians before the study.

Approval by the local ethical committee was obtained before the study.

The authors declared no potential conflicts of interest with respect to the research authorship, and/or publication of this article.

All the data of the patients and results of the study are confidential& the patients have the right to keep it.

The patient has the right to withdraw from the study at any time.

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Sample size:

The sample size was calculated by using the following formula:

$N= (z/\Delta)^2 X P (100 - P)$

Z: a percentile of slandered normal distribution determined by 95%.

Confidence level= 1.96.

A: the width of the confidence interval = 12.

P: the prevalence of the disease = 24.9%.

$N= (1.96/12)^2 X 24.9 (100 – 24.9)$ = 50 patients in each group.

PATIENTS AND METHODS

A prospective observational study was conducted on 100 children of both sexes admitted to Pediatric Intensive Care Unit (PICU) of Al -Azhar University Hospitals, pediatric department (El Hussein &Bab El Sheria) over a period of two years (2017-2018).

Selection Criteria for the Patients:

The subjects included in this study were selected according to inclusion and exclusion criteria.

Inclusion criteria: Patients admitted to the PICU (aged >1 month and <6 years) regardless of their underlying disease.

Exclusion criteria: Children with inborn error of metabolism, Patients with a PICU stay less or dying within the first 24 h of admission, Patients transferred to other PICUs, those with missing information on variables used to estimate the PRISM III or PIM 3 and Patients who left against medical advice.

All cases were subjected to the following:

A. Complete history: Personal, present, past, Dietetic, vaccination and family history: such as, age, relatives, consanguinity, blood transfusion, and drug history.

B. Clinical examination: General including anthropometric measurements such as, height, weight and body mass index (BMI). Local including cardiovascular, neurological, chest and abdominal examination.

C. Scoring procedure.

D. Prism score calculation: PRISM III was calculated within 12 hours of admission for each patient, using the 14th measured clinical and laboratory variables that include systolic and diastolic blood pressure, heart rate, respiratory rate, PaO2/FiO2 ratio, PaCO2, PT, PTT, total serum bilirubin, serum potassium, total serum calcium, blood glucose, serum bicarbonate, GCS and pupil response. Abnormal pupil response is defined by either unequal pupils or fixed and dilated. Total PRISM III score = (cardiovascular and neurologic sub score)+ (acid base and blood gas sub score)+ (chemistry sub score)+ (hematology sub score).

Pediatric Index of Mortality (PIM3) was calculated as follow: Record the observations at or about the time of first face to-face contact between the patient and a doctor from PICU. Use the first value of each variable measured within the period from the time of first contact to 1 hour after arrival in PICU. The first contact may be in PICU, or in emergency department, or a ward in your own hospital, or in another hospital.

E. Investigations:

- **Routine investigations:**

1. Routine investigation to clarify diagnosis and assessment of multi organ dysfunction syndrome.

- Complete blood count.

- ALT, AST, bilirubin, Urea and creatinine.
- Random blood sugar.
- Blood culture and other body fluids cultures if indicated.
- C-reactive protein.
- PT, PTT and INR.
- Electrolyte assay as serum sodium, potassium and calcium.

2- Lactate level:

- Sampling: two milliliters from the patient's blood were taken in a NA+ florid tube (Initial lactate). The sample delivered immediately to the lab without clotting. Another sample was taken 24 hours after starting treatment (Delayed lactate). Lactate clearance in 24 hours was calculated using the equation: [(lactate initial - lactate delayed)/ lactate initial] x 100%].
- Reference value for normal lactate level was (4.5-19.8 mg/dl).

Lastly the studied patients were divided into two groups according to death which was the primary outcome: Non survivors (14 patients) and Survivors (86 patients).

Statistical Analysis: Results were tabulated and statistically analyzed by using a personal computer using MICROSOFT EXCEL 2016 and SPSS v. 21 (SPSS Inc., Chicago, IL, USA.

RESULTS

Our results were tabulated and analyzed in the following tables and figures:

Table (1): Variable data of the studied patients

Variable	**On admission Mean± SD**	
Age:	36.69±23.89	
Weight:	12.94±5.27	
Length of stay in PICU **Min - Max**	4.62±3.16 1 - 15	
	No	**%**
Sex: **Male** **Female**	 58 42	 58% 42%
Outcome: **Survived** **deceased**	 86 14	 86% 14%
Common causes of admission: **Gastroenteritis with severe dehydration** **DKA** **Bronchopneumonia** **Congestive heart failure**	 10 9 8 5	 10% 9% 8% 5%

PICU: pediatric intensive care unit, SD: stander deviation

Table (2): Vital signs and Lab investigations of the studied patients on admission and after 24 hrs

	On admission (Mean ±SD)	**After 24 hrs. (Mean ±SD)**	**t test**	**P-value**
Heart rate	126.16 ±27.76	116.23 ±25.85	6.27	**<0.001****
Systolic Blood Pressure:	86.95 ±18.97	89.00 ±16.97	1.36	0.178^{NS}
Temperature	37.53 ±0.88	37.26 ±0.26	0.58	0.17^{NS}
Respiratory rate	33.27±9.54	28.63±7.60	6.49	**0.031***
Glasgow coma scale	13.1±2.3	13.5± 2.2	1.012	0.328^{NS}
Lactate	34.1 ± 25.7	21.3± 10.4	3.855	**0.002S**
Urea	42.9±28.94	42.6±2.84	0.043	0.966 ^{NS}
Creatinine	0.71±0.92	0.7±0.82	.781	0.437^{NS}
Na	139.70±8.75	136.84±19.94	1.420	0.159^{NS}
GLU	135.9± 95.4	108.5± 15.6	2.153	**0.048^{S}**
Total BIL	1.12±1.83	1.16±1.7	-1.159	0.249^{NS}

SD: stander deviation, t: paired t test, *significant NS: non-significant, Na: sodium, GLU: glucose Total BIL: total bilirubin

There were statistically significant differences between the studied patients regarding heart rate, respiratory rate, blood glucose and lactate level.

Table (3): Comparison between Survived and deceased patients regarding demographic data, vital signs and lab investigations

	Survived (Mean ±SD)		**Deceased (Mean ±SD)**		**t test**	**P value**
Age/months	47.9±21.2		37.4±25.7		1.11	0.285 NS
Weight/kg	12.74±5.23		14.19±5.50		0.00	1.00 NS
Length of stay in PICU/day	3.8±2.5		9.7±3.6		7.8	< 0.001 HS
	No(86)	**%**	**No(14)**	**%**	**X^2**	**P value**
Sex:						
- **Male**	50	58.14	8	57.14	0.005	0.95 NS
- **Female**	36	41.86	6	42.86		
Heart rate:					t=	
- **On admission**	129.14±40.98		125.67±25.27		0.307	0.763NS
- **After 24 hrs.**	137.29±36.33		112.80±22.16		2.45	0.028*
Systolic Blood Pressure:					t=	
- **On admission**	78.21±22.86		88.37±18.01		1.584	0.133NS
- **After 24 hrs.**	76.00±23.15		91.12±14.87		2.366	0.032*
Glasgow Coma Scale:						
- **On admission**	11.23±3.370		13.99±1.752		2.89	0.013*
- **After 24 hrs.**	8.78±3.232		14.94±2.627		5.53	<0.001
Urea:						
- **On admission**	52.9 ±28.91		41.01 ±30.71		1.041	0.315
- **After 24 hrs.**	66.90 ±33.51		38.07 ±27.38		3.055	0.008*
Creatinine:						
- **On admission**	1.05 ±0.78		0.66 ±0.93		1.700	0.105NS
- **After 24 hrs.**	1.26 ±0.85		0.6 ±0.79		2.696	0.015*
GLU:						
- **On admission**	133 ±37.91		136.5 ±103.5		0.096	0.925NS
- **After 24 hrs.**	106.2 ±18.21		108.9 ±15.3		0.451	0.658NS

SD: stander deviation, t: paired t test, NS: non-significant

There were statistically significant difference between Deceased and Survived groups regarding heart rate, systolic blood pressure, glascow coma scale, length of stay in PICU, blood urea and creatinine level.

Table (4): PRISM score III as regard outcome

		Deceased (N = 14)		Survived (N = 86)		Stat. test	P-value
PRISM (mean±SD)		25.43 ±11.88		8.91±5.12		5.128	<0.001**
PRISM III	0 - 5	0	0%	27	31.4%	54.8	<0.001HS
	6 - 10	0	0%	26	30.2%		
	11 - 15	2	14.3%	24	27.9%		
	16 - 20	4	28.6%	6	7%		
	21 - 25	2	14.3%	3	3.5%		
	26 - 30	4	28.6%	0	0%		
	> 30	2	14.3%	0	0%		

X2: Chi-square test, HS: p-value < 0.001 is considered highly significant.

Table (5): PIM 3 as regard outcome

		Deceased (N = 14)		Survived (N = 86)		Stat. test	P-value
PIM (mean±SD)		89.26±68.66		13.72±21.04		4.086	0.001*
PIM 3	(< 0)	0	0%	45	52.3%	18.5	<0.001HS
	(1 - 4)	0	0%	0	0%		
	(5 - 19)	0	0%	8	9.3%		
	(20 - 30)	4	28.6%	8	9.3%		
	> 30	10	71.4%	25	29.1%		

X2: Chi-square test, HS: p-value < 0.001 is considered highly significant.

Table (6): lactate Clearance as regard outcome

		Deceased (N = 14)		Survived (N = 86)		Stat. test	P-value
Lactate Clearance (mean±SD)		15.2±32.7		43.1±26.2		11.298	<0.001
Lactate clearance	<15%	11	78.6%	9	10.5%	X^2 = 33.687	< 0.001 HS
	15-30%	2	14.3%	14	16.3%		
	>30%	1	7.1%	63	73.2%		

X2: Chi-square test, HS: p-value < 0.001 is considered highly significant.

In the current study, there was statistically significant difference between Deceased and Survived groups regarding PRISM III Score, PIM 3 Score and Lactate Clearance (p<0.05).

Table (7): Correlation between PRISMIII, PIM3 Score and Lactate Clearance with the studied variables

			PRISM III	PIM3 Score	Lactate Clearance
Age		r	-0.085	-0.176	-0.081
		p.value	0.400	0.079	0.425
HR		r	0.447**	0.423**	-0.093
		p.value	<0.001**	<0.001**	0.359
Systolic Blood Pressure		r	-0.310-**	-0.165	-0.060
		p.value	0.002*	0.101	0.553
Diastolic Blood Pressure		r	-0.284-**	-0.442-**	0.131
		p.value	0.004*	<0.001**	0.192
Temp		r	-0.160	-0.152	0.124
		p.value	0.113	0.130	0.219
PaO_2		r	-0.360-**	-0.485-**	0.049*
		p.value	<0.001	<0.001	0.626
PCO_2		r	0.187	0.359**	-.488-**
		p.value	0.062	<0.001**	<0.001**
Base Deficit or Excess		r	-0.442-**	-0.269-**	0.094
		p.value	<0.001**	0.007*	0.354
Lactate	**At admission**	r	0.588**	0.351**	-0.0388
		p.value	<0.001**	0.0123*	0.778
	After 24 hours	r	0.116**	0.0129**	-0.0138
		p.value	<0.001**	<0.001**	<0.001**
Length of stay in PICU		r	0.677**	0.709**	-.241*
		p.value	<0.001**	<0.001**	.016*

There was significant correlation between PRISM III and PIM3 Scores with HR, diastolic blood Pressure, PaO2, Base Deficit or Excess, Lactate and Length of stay in PICU ($p<0.001$). Also, there was significant positive correlation between Lactate Clearance with PaO2and PaCO2 , ($p<0.001$), while there was negative correlation between lactate clearance with PRISM III, PIM 3 and length of stay in PICU

Table (8): Determination of cutoff value of Lactate Clearance, PRISM III score and PIM3 Score with sensitivity and specificity

Cut off point	Sens%	Spec%	PPV	AUC	Std. Error	Asymptotic Sig.[b]	95%CI
Lactate Clearance (15.4)	88.1	87.5	0.974	0.935	0.0427	0.678	0.77-0.98
PRISM III (16)	80.9	87.5	0.971	0.928	0.0395	0.772	0.67-0.94
PIM3 Score (33.3)	76.2	75.0	0.941	0.907	0.0611	0.890	0.68-0.97

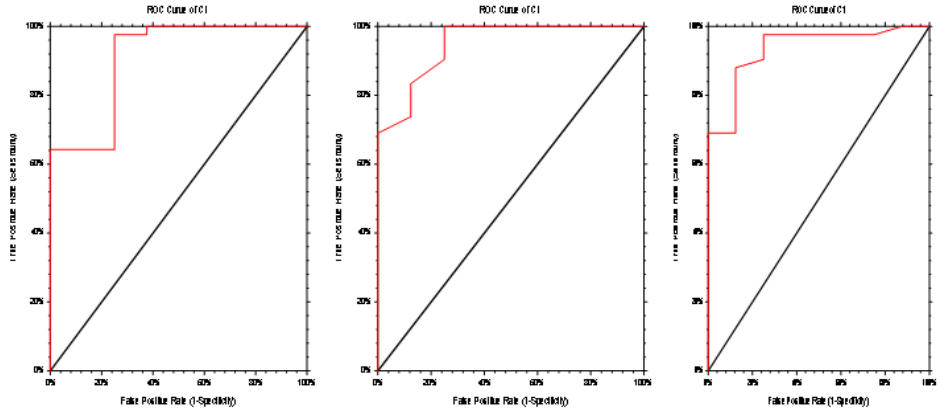

Figure (1): ROC curve for the validity and predictively of Lactate Clearance, PRISM III and PIM3 Scores

Lactate Clearance, PRISM III score and PIM3 Score showed a receiver-operating-characteristics area under the curve (ROC-AUC) value of 0.974, 0.971 and 0.941 respectively to predict PICU mortality (cut-off showing highest sensitivity was 24 h Lactate Clearance of 15.4 followed by PRISM III score 16 and PIM3 Score of 33.3, with sensitivity 88.1%, 80.9% and 76.2% respectively, and specificity was 87.5%, 87.5% and 75% for each respectively.

DISCUSSION

In the current study, there were no statistically significant difference between survived and deceased groups regarding age, weight and Sex (p>0.05). While, there was highly significant difference between survived and deceased groups regarding length of stay in PICU, it was higher in deceased patients (9.7± 3.6 days) than in survived patients (3.8± 2.5 days). In the study done by **Tan et al., (2019)** found that the median PICU stay was 8.5 (IQR 2–14; range 0.2–35) days. The mean duration of the PICU stay among survivors and non survivors were 12.2 ± 7.4 and 6.0 ± 9.0 days, respectively as non survivors stay less. Whereas, **Aramburo et al., (2018)** found that the duration of stay was longer in those with good clearance because of early mortality in the ones with poor clearance.

Also, in the present study, hypovolemic shock due to gastroenteritis, DKA, bronchopneumonia and congestive heart failure were the most admission causes among the studied patients. It represented by 10%, 9%, 8% and 5%, respectively.

In the study done by **Kim et al., (2019)** found the 3 most common reasons for these admissions were CNS emergencies (36.3%), respiratory emergencies (25.7%), and cardiac emergencies (12.4%).

In the present study, there was statistically significant difference between Deceased and Survived groups after 24 hours regarding mean heart rate, systolic blood Pressure, Temp, Respiratory Rate and Glasgow Coma Scale. This result is in agreement with a prospective cohort study in 32 adult patients with septic shock was studied by **Gernardin et al., (1996)** to identify early prognostic markers of septic shock. Mean arterial blood pressure and lactate were measured at admission and at 24 hours. Among 32 patients, 18 survived. After 24 hours, non-survivors had significantly lower mean arterial blood pressure and higher lactate level than survivor. 24 hours changes of lactate and blood pressure was also of prognostic value.

In the current study, blood glucose level was significantly decreased after 24 hours (108.5±15.6) as compared on admission (135.9±95.4). While, there were no statistically significant differences between the studied patients regarding urea and creatinine (p>0.05). There was statistically significant difference between Deceased and Survived

groups after 24 hours regarding Urea and Creatinine, ($p<0.05$). While, there was no statistically significant difference between deceased and survived groups after 24 hours regarding blood glucose level ($p>0.05$).

In the current study there was no statistically significant difference between studied patients regarding blood lactate level. There was no statistically significant difference between survived and deceased patients regarding initial lactate level while, there was statistically significant difference between survived and deceased patients regarding delayed lactate level.

These results were in agreement with those of **Jat et al., (2011)**, who found that urea, creatinine, different lactate levels were significantly higher among non-survivors as compared to survivors and the area under the ROC curve for all three lactate levels was just at the significance level. Another study by **Kim et al., (2013)** they measured lactate initially and at 24 hours and found that the initial lactate level was significantly worse in non-survivors than in survivors. Patients with initial lactate levels higher than 5 mmol/l showed a significantly higher mortality rate. But these results disagree with **Munde et al., (2014)** who found that the initial lactate was not significantly different between those who died and those who survived.

Results in the present study indicated that there was statistically significant difference between deceased and survived groups regarding PRISM III score and PRISM III risk of mortality ($p<0.05$). PRISM III score and PRISM III risk of mortality was increased among patients whose deceased compared with survived group. As PRISM score between (0-10) showed no mortality while score more than 25 showed mortality of all patients. Our results were quite comparable with **Munde et al., (2014)** they showed that the PRISM score was also higher in those who died compared with those who survived. As PRISM score between (0-5) showed no mortality while score more than 35 showed mortality of 12 cases out of 45 cases.

In the current study, there was significant correlation between PRISM III score and PIM3 Score with HR, diastolic blood Pressure, Pao_2, Base Deficit or Excess, Lactate and Length of stay in PICU. Also, there was significant positive correlation between Lactate Clearance with Pao_2 and $PaCO_2$ while, there was negative correlation between lactate

clearance with PRISM III, PIM 3 and Length of stay in PICU. These results were in agreement with those of **Munde et al., (2014)** who found that an inverse relationship was observed between lactate clearance and PRISM score. Also, **Nazir et al., (2019)** found that there was statistically significant difference between lactate clearance after 6 hours and PRISM III score as increase lactate clearance is associated with low PRISM III score while cases with high PRISM III score is associated with low lactate clearance.

In the current study, Lactate Clearance, PRISM III score and PIM3 Score showed a receiver-operating-characteristics area under the curve (ROC-AUC) value of 0.974, 0.971 and 0.941 respectively to predict PICU mortality (cut-off showing highest sensitivity was 24 h Lactate Clearance of 15.4% followed by PRISM III score 16 and PIM3 Score of 33.3, with sensitivity 88.1%, 80.9% and 76.2% respectively, and specificity was 87.5%, 87.5% and 75% for each respectively. In **Haas et al., (2016)** study found that lactate clearance after 12 h showed a receiver-operating-characteristics area under the curve (ROC-AUC) value of 0.91 to predict ICU mortality (cut-off showing highest sensitivity and specify was a 12 h lactate clearance of 32.8%). In 268 patients having a 12-h lactate clearance <32.8 % ICU mortality was 96.6%.

CONCLUSION

Lactate clearance showed higher sensitivity and specificity than PRISM III and PIM 3 so serum lactate level should be used as one of the first laboratory orders to be measured to all cases admitted at pediatric intensive care unit at admission and after 24 hours followed by calculation of lactate clearance.

PIM 3 and PRISM III scoring system shows adequate discriminatory function and well calibrated for the case mix of patients in PICU of Al-Azhar University hospitals. It can be used as a beneficial tool for evaluation of risk adjusted mortality. Despite of good performance of PIM III and PRISM III scoring system in Al Azhar University PICU. Further larger scale studies in cooperation with other universities of Egypt as well as neighboring countries are required for the optimal use of the score within our region.

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صلاحية ازالة اللاكتات مقابل مقابل مقياس نقاط مخاطر الموت الثالث ومقياس دلائل الموت الاطفال الثالث فى توقع الوفيات فى العناية المركزة للاطفال

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الهدف الرئيسى من وحدات العناية المركزة للاطفال هو الحد من الوفيات لذلك تستخدم انظمة التهديف للتنبؤ بنتائج المرضى الذين يتم ادخالهم الى وحدة العناية المركزة. وعلاوة على ذلك يم استخدامها لتقييم اداء العناية المركزة.

النقاط الرئيسية التي وضعت من أجل مرضي الأطفال هي ما يعرف ب (مخاطر وفاة الطفل) و (مؤشر وفاة الطفل)، وأحدث إصدارات منها هي مخاطر وفاة الطفل الثالث و مؤشر وفاة الطفل الثالث. وقد تم تطوير هذه النتائج عن طريق تحديد المتغيرات ذات الصلة بخطر الوفيات وتسجيلها بعد التحليل الإحصائي المتعدد للمتغيرات وذلك عن طريق الإنحدار اللوجستي.

يتم استخدام مستويات لاكتات الدم في العديد من الحالات، مثل علامات تروية الأنسجة في المرضى الذين يعانون من الصدمات، ومؤشر للإنعاش بعد الصدمة، ومؤشر

تنبؤي بعد الإنعاش، وعامل تنبؤي في حالة الأمراض الخطيرة.

الهدف من هذه الدراسة:

هو تقييم أداء نقاط مخاطر الموت الثالث ومقارنته مع مقاس مخاطر الموت الثالث وإزالة اللاكتات في الدم للتنبؤ بالوفيات الفعلية بين المرضى في وحدة العناية المركزة للأطفال في مستشفيات جامعة الأزهر (الحسين وباب الشعرية).

أُجريت هذه الدراسة الرصدية المحتملة على 100 طفل من الجنسين الذين تم قبولهم في وحدة العناية المركزة للأطفال في مستشفيات جامعة الأزهر- قسم الأطفال (الحسين وباب الشعرية) على مدى عامين (2017-2018). وتم الحصول على موافقة مستنيرة من قبل الآباء قبل إدراج المرضى في الدراسة، والتي تمت الموافقة عليها من قبل اللجنة الأخلاقية لكلية الطب مستشفى جامعة الأزهر.

معايير الاشتمال: المرضى الذين تم قبولهم في وحدة العناية المركزة (الذين تزيد أعمارهم عن شهر واحد و وتقل عن 6 سنوات) بغض النظر عن مرضهم الأساسي.

معايير الاستبعاد: الأطفال الذين يعانون من خطأ في الأيض، مرضى وحدة العناية المركزة للاطفال الذين ماتوا في غضون الـ 24 ساعة الأولى من الدخول و المرضى الذين تم نقلهم إلى

وحـــدات عنايـــة مركـــزة أخـــرى والمرضـــى الـــذين غـــادروا بـــدون المشورة الطبية.

وقـــد قســـمت الحـــالات الـــى مجمـــوعتين وفقـــا لحـــدوث الوفـــاة مـــن عدمه:

- مجموعة الناجين وشملت 86 طفلا.
- مجموعة المتوفيين وشملت 14 طفلا.

يمكن تلخيص النتائج في الدراسة الحالية على النحو التالي:

- وصلت نسبة الوفيات الى 14%.

فـــى دراســـتنا تبـــين ان هنـــاك علاقـــة قويـــة بـــين كـــل مـــن محصـــلة نقـــاط مخـــاطر المـــوت الثالـــث و مقيـــاس مخـــاطر المـــوت الثالث والوفاة حيث زادت نسبة الوفاة كلما زادت المحصلة.

التوصيات:

اســـتخدام اللاكتـــات بالـــدم ومعـــدل اســـتخلاص اللاكتـــات فـــى متابعـــة ســـير المـــريض داخـــل الرعايـــة المركـــزة للاطفـــال واســـتخدام قيمتهم التكهنية في ما يخص الوفاة بالنسبة لهؤلاء المرضى.