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MORBIDITY PROFILE AND SURVIVAL OF CRITICALLY ILL CHILDREN IN A TERTIARY PEDIATRIC INTENSIVE CARE UNIT

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ABSTRACT

Background: The aim of this study was to evaluate the morbidity profile and survival of critically ill children admitted to the tertiary pediatric intensive care unit (PICU) during the last ten years.

Methods: A retrospective single-center, observational study, which included all consecutive children treated in the PICU over a ten years. Clinical and demographic data were obtained from medical records and an electronic database of patients. Statistical analysis applied standard methods, and the research was approved by the Ethics Committee of the institution.

Results: In the ten-year, 28,214 children were hospitalized at the clinic, of which 4,052 (14.36%) in the PICU, 2488 of them were neonates (61.4%), and 1564 over neonatal age (38.6%), 508 infants (32.5%), and 1056 children >1.0 years (67.5%), without gender difference. The morbidity profile and survival were age-specific. Respiratory failure was the most common, especially in premature neonates. Mortaliti rate in neonates was 10.8%, and over neonatal age 6.7%.

Conclusion: In the past decade in our centre decreased number of total hospitalisations, and increased admissions to PICU. The number of neonates admitted to our PICU increased significantly, especially premature ones, without gender differences. The morbidity profile and survival were age-specific.

Keywords: Pediatric intensive care units, morbidity, survival, mortality, outcome

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INTRODUCTION

Pediatric intensive care units appeared in the 1960s and have evolved dramatically since then [1]. Their development has revolutionized treatment in the areas of lung injury, sepsis, traumatic brain injury and post-operative care of children [2]. Mechanical ventilation was and remains the key point and backbone of intensive treatment, which is rapidly developing, intertwined with progress in other areas, primarily cardiac surgery, neonatology, nephrology and other branches of medicine [3].

Pediatric intensive care units are crucial in the treatment of critically ill children who need airway, respiratory and hemodynamic support, with the aim of achieving a better outcome, short-term, with the aim of better survival, but also long-term, with the aim of a better neurological outcome [4]. Today, pediatric intensive care units are trying to treat children with complex and chronic diseases that previously might not even have been considered for admission [5], while the mortality rate for some critical diseases has been significantly reduced. These changes are the result of a better understanding of critical illness, specialized training in pediatric intensive care, centralization of pediatric intensive care services, advances in other areas of medicine, and the introduction of new treatment modalities [6].

It should be emphasized that these are the most complex types of medical treatment, which require huge resources, material, technical, human and professional, so the survival and development of these departments must be supported by the entire social community.

There are different levels of care, different pathology that dominates in certain pediatric intensive care units, which depends on several factors [7]. In recent decades, efforts have been made to standardize intensive treatment and assessment methodology. Over the years, numerous scoring systems have been created to assess the severity of the disease and to monitor

and predict the outcome [8-11]. Critically ill children are characterized by large variations in normal body homeostasis. Disease severity and life-threatening conditions are usually scored by measuring the deviation of physiological variables from the normal range. Some of scoring systems were created specifically for certain diseases, and some specifically for age groups of patients. At the same time, they are used to evaluate and compare the quality among individual pediatric intensive care units.

Our medical institution has been developing a pediatric intensive care unit for over 50 years, and for the last 15 years it has been developing as a multidisciplinary combined neonatal and pediatric unit that cares for life-threatening children from 0 to 16 years of age. The aim of this study is to evaluate the morbidity profile and survival of critically ill children admitted to the tertiary pediatric intensive care unit of the University Clinical Center Tuzla during the last ten years.

PATIENTS AND METHODS

A retrospective single-center, observational study, which included all consecutive children and neonates who were treated in the Intensive Care Unit (ICU) of the Pediatric Clinic University Clinical Center Tuzla (capacity 22 beds, level III) over a period of ten years (January 1, 2013-December 31, 2022). The study was approved by Hospital's Ethics Committee.

The data source for this research was the Pediatric Clinic Admission Protocol and the Intensive Care Unit Protocol and the medical records of children treated in the Intensive Care Unit of the Pediatric Clinic University Clinical Center Tuzla. Clinical and demographic data were obtained from medical records and an electronic database of patients treated in the ICU, which included gender, age, morbidity analysis, diagnoses, length of ICU stay, and outcome.

During admission, clinical status of neonates was scored by the SNAP-PE II (Score for Neonatal Acute Physiology - Perinatal Extension) and CRIB II - Clinical Risk Index for Babies score [8]. For patients over neonatal age, the following scoring systems were calculated at admission: Pediatric risk of mortality – PRISM IV [9], the Pediatric index of mortality - PIM III [10], and Pediatric logistic organ dysfunction score – PELODS II [11]. Clinical characteristics such as vital parameters, pulse, respirations, systolic blood pressure, body temperature, pupillary light reflex, oxygen saturation, diuresis and need for mechanical ventilation (MV) were assessed and documented within the first hour of admission and documented in the medical records in within the framework of patient monitoring, and at the same time were the basis for electronic registration and calculation of the scoring system for critically ill children (SNEP-PE II, CRIB II; PRISM IV, PIM III, PELODS II).

For statistical analysis were used standard methods of descriptive statistics (central tendency measures, dispersion measures). Parametric and non- parametric significance tests (X^2-test, Student's t- test) were used to test the significance of differences between the samples. Statistical hypotheses were tested at a significance level of $\alpha = 0.05$, i.e. The difference between the samples is considered significant if $p < 0.05$. We used Systat Software, Systat Inc, Evanstan, IL, USA for statistical processing of data.

RESULTS

In the ten-year period (from January 1, 2013 to December 31, 2022), 28,214 children were treated in the Pediatric Clinic of the Tuzla University Clinical Center, of which 4,052 children (14.36%) required treatment in the Intensive Care Unit. Among the children treated in the Intensive Care Unit, 2488 were neonates (61.4%), who were admitted to the neonatal ICU. 1564 children (38.6%) were admitted to the pediatric ICU, of which 508 were infants aged 29 days to 1.0 years (32.5%), and 1056 were children over 1.0 years of age (67.5%). Basic data on admission ICU trends, by year in the observed decade, are shown in Table 1.

Table 1. Intensive care unit admissions data by years

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Hospital admissions	3233	3166	2981	2865	3014	2946	2969	1833	2380	2827	28214
ICU admission	330	350	330	377	462	486	500	347	396	474	4052
Male	181	186	177	185	229	245	264	179	201	241	2088
Female	149	164	153	192	233	241	236	168	195	233	1964
Neonatal ICU	138	177	180	247	332	342	345	242	215	270	2488
Preterm	85	107	111	149	182	170	190	152	138	143	1427
Full-term	53	70	69	98	150	172	155	90	77	127	1061
Live birth	4095	3972	3740	3739	3759	3475	3407	3011	2820	2713	34731
Premature born (n)	274	299	263	275	281	263	295	294	264	283	2791
Full-term born	3821	3673	3477	3464	3478	3212	3112	2717	2556	2430	31940
Prematurity rate (%)	6.69	7.53	7.03	7.35	7.47	7.56	8.65	9.76	9.36	10.43	8.04
% preterm for ICU	31.1	35.8	42.2	54.2	64.8	64.6	64.4	51.7	52.3	50.5	51.1
% full-terms for ICU	1.4	1.9	2.0	2.8	4.3	5.4	5.0	3.3	3.0	5.2	3.3
Pediatric ICU	192	173	150	130	130	144	155	105	181	204	1564

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Infants (29 days - 1.0 years)	53	58	55	38	55	52	44	39	54	60	508
> 1.0 years	139	115	95	92	75	92	111	66	127	144	1056
MV	109	112	111	131	148	133	167	112	124	120	1267
Neonatal MV	101	103	103	108	125	118	150	101	104	103	1116
Pediatric MV	5	5	5	11	11	6	10	5	10	13	81
Mortality	36	37	33	42	38	39	36	41	36	38	376
Neonatal mortality	28	27	25	28	23	27	23	30	27	32	270
Pediatric mortality	8	10	8	14	15	12	13	11	9	6	106

ICU- intensive care unit; Mechanical ventilation- MV; Infants - age from 29 days - 1.0 year

The share of ICU admissions in the total number of hospitalizations during the past decade and the requirements for mechanical ventilation are shown in Figure 1.

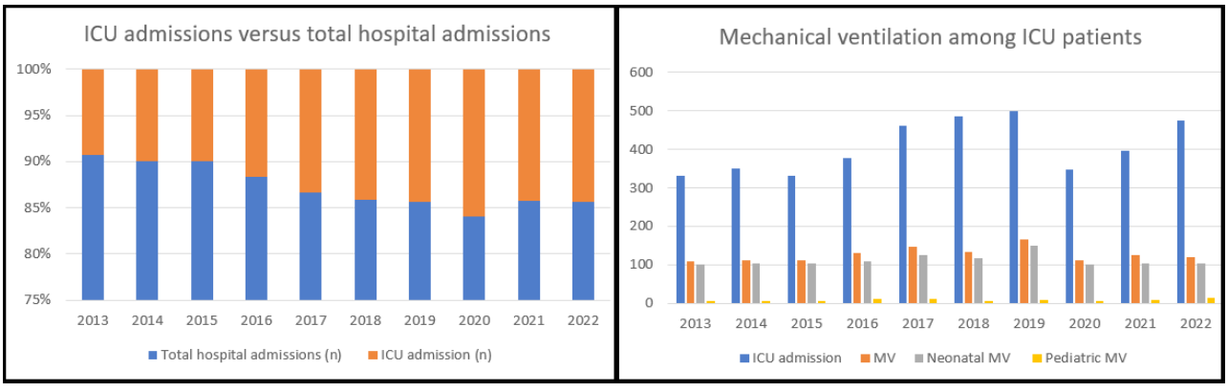

Figure 1: ICU admissions versus total hospital admissions by years and mechanical ventilation among ICU patients

In the past decade, there has been a steady increase in the number of neonates admitted to the ICU, although at the same time there is a steady decline in the number of live births in our University Clinical Center Tuzla (Table 1). An increase in the rate of prematurity was also recorded, from the recent around 7.5% to the last over 10% (Table 1). At the same time, admission to the PICU of children over the neonatal age was generally uniform over the past ten years (Table 1).

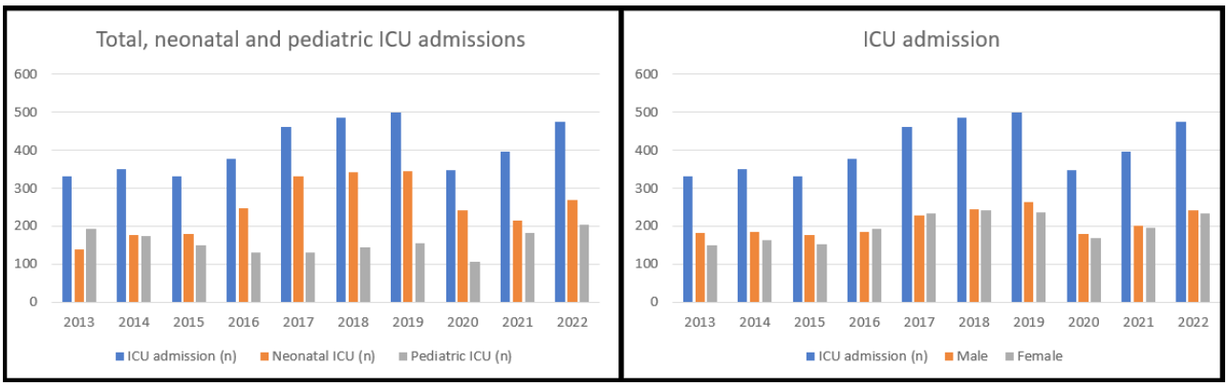

Figure 2: Total, neonatal and pediatric ICU admissions with gender distribution by years

Figure 2 shows the gender distribution of PICU admissions over the last decade. Regarding the gender distribution of admitted children, there were no significant differences in the ten-year period, with 51.5% boys and 48.5% girls. Gender distribution by age and outcome group is shown in Table 2. A slight advantage of males in neonatal age and females after neonatal age was recorded. The biggest differences were recorded in premature neonates, where males more often required admission to the PICU and more often ended fatally, but these differences were not statistically significant either.

Table 2. Gender distribution of patients treated in ICU during the last decade

ICU data	Admissions	n	%	Deaths (n)	%	p
ICU as one	Total	4052		376		0.68
	M	2088	51.5	212	56.4	
	F	1964	48.5	164	43.6	
Neonatal ICU	Total	2488		270		0.66
	M	1313	52.8	154	57.0	
	F	1175	47.2	116	43.0	
Preterm (<37GW)	Total	1427		228		0.62
	M	770	54.0	132	57.9	
	F	628	46.0	96	42.1	
Full term (≥37GW)	Total	1061		42		0.89
	M	543	51.2	22	52.4	
	F	518	48.8	20	47.6	
Pediatric ICU	Total	1564		106		0.77
	M	775	49.6	58	54.7	
	F	789	50.4	48	45.3	
Infants (29 days - 1.0 years)	Total	508		51		0.76
	M	264	52.0	28	54.9	
	F	244	48.0	23	45.1	
Children >1.0 year	Total	1056		55		0.7
	M	511	48.4	31	56.4	
	F	545	51.6	24	43.6	

ICU – intensive care unit; M – male; F – female; GW – gestational weeks

The most common reason for admission to the ICU was severe respiratory, circulatory or neurological dysfunction, due to various diseases and conditions. The most common reason for admission in all age groups was potential or evident respiratory failure, with the need for oxygen supplementation or mechanical ventilation. A specific age distribution of the need for mechanical ventilation was recorded here as well (Figure 1). During the observed decade, in our PICU patients, the need for mechanical ventilation increased significantly, primarily for neonates, while for children over neonatal age, it was mostly uniform over the years.

The morbidity structure was also age-specific. In neonates, prematurity and respiratory pathology were the most common, but perinatal asphyxia and sepsis accounted for a significant proportion. In premature neonates, respiratory distress syndrome, intracranial hemorrhage and sepsis dominated, while in full-term neonates, perinatal asphyxia, pneumonia and sepsis were the leading causes. A significant number of neonates had cardiac disease (9.0%), congenital anomalies (8.5%), and surgical treatment was required by 6.5% of neonates (Table 3). It should be noted that our clinic has a developed Department of Pediatric Surgery, which improved and facilitated the treatment. Unfortunately, we still do not have cardio-surgical treatment, except in centers outside Bosnia and Herzegovina, which significantly complicates treatment for a certain group of life-threatening children. Of the metabolic disorders, the most common is hyperbilirubinemia, for which approximately 500 neonates are treated annually at the clinic, half of them in the PICU. Phototherapy is the standard of care, but 5-10 neonates a year require exchange transfusion.

In infants (age 29 days to 1.0 years), besides respiratory, neurological pathology, infections and congenital anomalies were significant. In this age group, the majority of admissions were due to respiratory pathology, of which one-sixth required mechanical ventilation. A quarter of patients in this age group had neurological pathology, most often it was convulsive status and conditions with reduced consciousness. A significant number of infants had heart diseases (11.8%), congenital anomalies (9.0%), while 13.6% of them required surgical treatment (Table 3). In this group, too, a number of children required transfer to foreign centers, due to the necessary cardio-surgical treatment.

Data on the prevalence of certain diseases and clinical conditions in children admitted to the ICU are presented in the Table 3.

Table 3. Age distribution of morbidity in patients admitted to ICU

Neonatal (0-28 days), n=2488		Infants (29 days - 1.0 years), n=508		>1.0 years, n=1056
Conditions	n(%)	Conditions	n(%)	Conditions
Prematurity	1427 (57.35%)	Respiratory	255(50.2%)	Respiratory
RF/MV	1116 (44.9%)	RF/MV	78 (15.4)	RF/MV
RDS	1256 (50.5%)	Neurological	115(22.6%)	Neurological
Per.asphyxia	633 (25.4%)	Gastroenterolog.	31 (6.1%)	Gastroenterolog.
Pneumonia	546 (21.9%)	Oncological	23 (4.5%)	Oncological
Sepsis	740 (29.7%)	Sepsis	57 (11.2)	Sepsis
Cong.anomalies	212 (8.5%)	Cong.anomalies	46 (9%)	Trauma/ accidents
ICH	745 (29.9%)	Nephrological	17 (3.3%)	Nephrological
Convulsions	213 (8.6%)	ND disorders	11 (2.1%)	Ketoacidosis
Surgical	156 (6.3%)	Surgical	69 (13.6%)	Surgical
Cardiological	224 (9%)	Cardiological	60 (11.8%)	Cardiological
Metabolic	131 (5.3%)	Chronic diseases	57 (11.2%)	Chronic diseases

ICU- intensive care unit; RF - respiratory failure; MV- mechanical ventilation; RDS- respiratory distress syndrome; ICH- intracranial hemorrhage; ND- neurodevelopmental

In children over 1.0 years of age, respiratory and neurological pathologies accounted for a quarter of morbidity, while mechanical ventilation was required by 8.5% of children of this age group. Surgical patients accounted for 14.3%, cardiology 6.6%, hemato-oncology 8.7%, and sepsis 7.4% of morbidity. Of the metabolic disorders, the most common was ketoacidosis in 7.1%. Polytrauma and head trauma are usually admitted to other specialized intensive care units, so 9.5% of children over 1.0 years of age were treated in our PICU for trauma and intoxication. Exacerbation of chronic diseases was a significant reason for admission, in 11.2% of infants and in 20.5% of children over 1.0 years of age (Table 3).

These numbers have been mostly consistent over the years, while the COVID-19 pandemic has changed morbidity. It is interesting that during the pandemic the need for respiratory support did not increase significantly, more for cardiac monitoring, immunological assessment and support. The need for hemodialysis in children as part of post-viral complications: Multisystem Inflammatory Syndrome in Children (MIS-C) and hemolytic-uremic syndrome (HUS), but also in children with complications of oncological diseases and sepsis, has increased significantly. An average of five patients per year were dialysed, an average of up to seven hemodialysis per patient, while, in particular, only four patients with HUS required a total of 104 dialyses.

The mortality trend in our patients over the past decade is shown in Figure 3. On average, the mortality of children after neonatal age was about ten children per year (6.7%), while for neonates it was two to three times a greater number (10.8%).

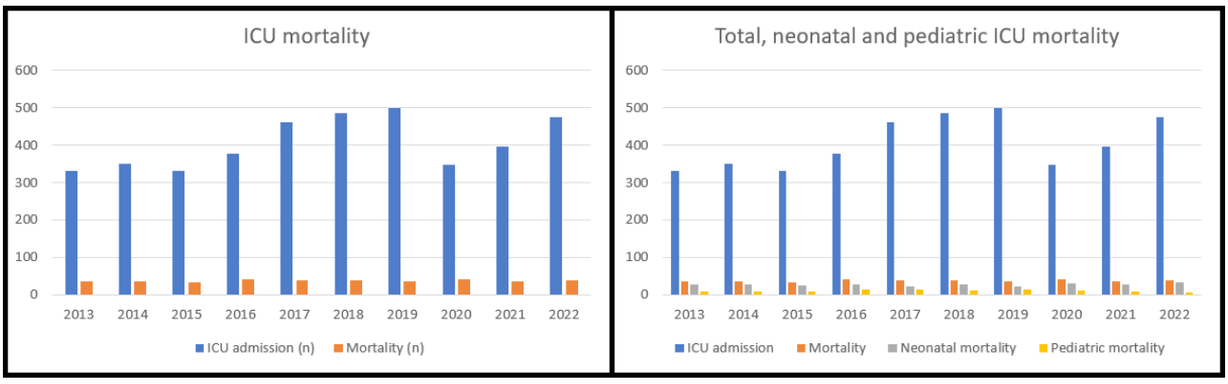

Figure 3: ICU mortality with age distributions by years

Prematurity and related complications were the leading cause of mortality, with no significant gender difference. These results are illustrated in Figure 4.

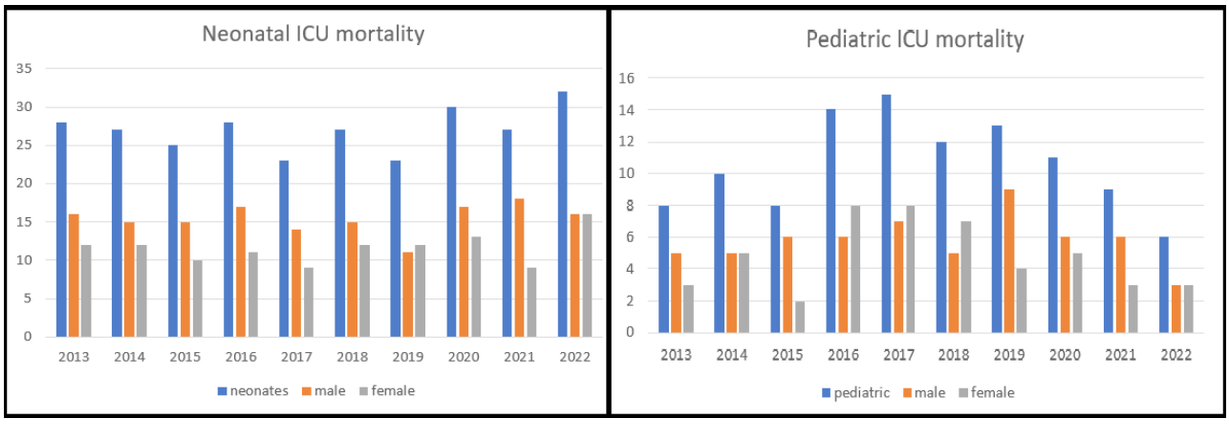

Figure 4: Neonatal and pediatric ICU mortality with gender distribution by years

The most common causes of infant mortality were infections and congenital anomalies. The most common causes of mortality in older children were malignant diseases, trauma, infections and congenital anomalies. Chronic diseases and complications were a significant cause of mortality in children over neonatal age. Some differences in the gender distribution of mortality of children over neonatal age were recorded, but they were not statistically significant. Multi-organ failure was the cause of mortality, more precisely, it preceded the fatal outcome, in most cases and in all age groups. These results are shown in Table 4.

Table 4. Cause of death according to age groups

Neonates (0-28 days), n=270		Infants (29 days - 1.0 years), n=53		Children >1.0 years, n=53
Conditions	n(%)	Conditions	n(%)	Conditions
Prematurity	227 (84.1%)	Cong.anomalies	9 (17%)	Cancer
PA with MOD	12 (4.4%)	Sepsis with MOD	7 (13.2)	Injuries
Sepsis with MOD	12 (4.4%)	CHD	17 (32%)	Sepsis with MOD
Cong.anomalies	14 (5.2%)	SMA	4 (7.5%)	CHD
CHD	5 (1.9%)	Injuries	4 (7.5%)	ND/chr. diseases

PA – perinatal asphyxia; MOD- multiorgan dysfunction; SMA- spinal muscular atrophy; CHD - congenital heart defects/disease; ND- neurodevelopmental

Age and severity of the disease were the strongest predictors of fatal outcome. Premature neonates ended fatally more often, and of all children over neonatal age, younger infants had a fatal outcome more often. The non-survival group had a statistically significantly lower gestational age in neonates (35.1 vs 30.5 gestational weeks) especially in preterm neonates (32.8 vs 29.0 gestationa weeks) and a younger chronological age in the pediatric patient group. These results are presented in Table 5.

Table 5. ICU mortality by age category

ICU data	Admission n (%)	Deaths n (%)	% from ICU admission	p
ICU total	4052 (100%)	376 (100%)	9.2%	1.0
Neonatal ICU	2488 (61.4)%	270 (71.8%)	10.8%	0.0001
Average GA	35.12± 3.279646 GW	30.52± 3.789625 GW		0.00001
preterm	1427 (57.4%)	228 (84.4%)	15.9%	0.00001
Average GA	32.86± 2.11 GW	29.03± 2.36 GW		0.00001
Full-term	1061 (42.6%)	42 (15.6)	3.9%	0.00001
Average GA	38.16± 1.67 GW	38.62± 1.32 GW		1.0
Pediatric ICU	1564 (38.6%)	106 (28.2%)	6.7%	0.0001
Average age	42.7 ±54.321 months	45.9 ±41.331 months		0.2146
infants	508 (32.5%)	51 (48.1%)	10%	0.001

ICU data	Admission n (%)	Deaths n (%)	% from ICU admission	p
Average age	3.7 ±2.273 months	4.7 ±2.708 months		0.257
>1.0 year	1056 (67.5%)	55 (51.9%)	5.2%	0.001
Average age	72.1 ±69.398 months	82.6 ±82.05 months		0.0033

ICU – intensive care unit; GA - gestational age; GW- gestational weeks

The severity of PICU patients' disease was higher in the non-survival group, based on all applied scoring systems. In addition, the non-survival group had a statistically significant difference in the length of intensive treatment. In the neonatal age, the survivor group had a longer intensive treatment, compared to the non-survivors, while in the group over the neonatal age, the treatment was significantly longer in the non-survivors group (Table 6).

Table 6. The severity of the disease and the length of intensive treatment

Scoring systems	Survivor	Non-survivor	p-value
SNAP-PE 2	23.51337±24.99298	36.80952±20.07889	0.0008
CRIB 2	3.941176±4.078763	5.952381±4.318289	0.0029
PRISM 4	6.75±8.30	20.29±8.48	<0.00001
PIM 3	3.80±0.20	37.19±0.21	<0.00001
PELOD 2	2.71±4.72	11.27±4.90	<0.00001
ICU stay (days)			
Neonates	8.69±1.45	4.64±1.82	<0.0001
Preterm	11.97±2.35	4.83±2.07	<0.0001
Full-term	4.91±0.92	3.51±2.01	0.0457
over neonatal age	3.31±0.61	28.01±23.66	<0.0001
Infants	3.94±1.1	17.5±0.63	<0.0001
Children >1.0 year	2.98±0.69	33.25±45.14	<0.0001

SNAP-PE 2: Score for Neonatal Acute Physiology - Perinatal Extension; CRIB 2: Clinical Risk Index for Babies score; PRISM 4: Pediatric risk of mortality; PIM 3: the Pediatric index of mortality; PELOD 2: Pediatric logistic organ dysfunction score; *(all individual data for the scoring systems were not available every time, in that case they were calculated as zero). Infants (29 days - 1.0 years)

DISCUSSION

The morbidity profile of our PICU patients has changed over time. In the last decade, this is primarily the result of a new organization of the service, because due to the centralization of resources, our PICU is now a multidisciplinary combined neonatal and pediatric unit. According to our results, in the past decade there has been a trend of a decrease in the number of total hospital admissions, but with a simultaneous increase in admissions to the Pediatric intensive care unit (PICU). The share of PICU admissions in the number of all hospitalizations was about 10%, but during the past decade it has increased to an average of 15%. The key fact was precisely the age specificity of the need for intensive treatment, which is inversely proportional to the age of children, which means that it was greatest in neonates, especially premature ones, in which it also increased according to immaturity level. In the past decade, there has been a steady increase in the number of neonates admitted to the ICU, although at the same time there is a steady decline in the number of live births in Bosnia and Herzegovina, and in our University Clinical Center Tuzla. This can be partly explained by the recorded increase in the rate of prematurity in our region, from the recent around 7.5% to the last over 10%. In the past decade, over 50% of all premature neonates, and about 3.5% of all full-term neonates, required PICU treatment at birth. Results vary in different settings, but in most cases the ratio of preterm to term neonates admitted to the PICU is 2:1 [12-19].

Data on the number of PICU admissions and types of patients varies from facility to facility and are influenced by multiple factors. The limits of what is possible have been shifting in the last decades, especially in intensive care and especially in neonatology.

The essence of intensive care is mechanical ventilation, and the demands for this type of intensive supportive care have increased significantly over the past decade. These data were significantly influenced by the age specificity of the requirement for mechanical

ventilation, which was highest in neonates, especially premature ones, while in other age groups of children the need for mechanical ventilation was maintained at an approximately similar level of about 5%. Again, results vary in different settings, with different modes of respiratory and ventilatory support being preferred. In general, for the last two decades it is recommend and prefer non-invasive and so-called "gentle" methods of mechanical ventilation, intubation, as well as non-invasive methods of exogenous surfactant administration [20, 21].

Regarding the gender distribution of admitted children, there were no significant differences in the ten-year period, with 51.5% boys and 48.5% girls. The gender distribution of children treated in the PICU also varies from center to center, usually without a significant difference, except that males (12-19) usually predominate among deceased neonates, which is also the case in our report.

The most common reason for admission to the ICU was severe respiratory, circulatory or neurological dysfunction, due to various diseases and conditions. The morbidity structure was also age-specific. In neonates, prematurity were the most common reason. That's to be expected, given that preterm birth had a worldwide prevalence of 10.6%, affecting nearly 15 million births annually [20, 21].

The focus of the pediatric intensive care unit has evolved from saving life to preserving function. Morbidity rates in the PICU are usually reported as double the mortality rates. Morbidity during intensive treatment, in addition to pre-admission diseases and conditions, also includes the development of multisystem organ dysfunction and other complications, which requires the need for vasoactive drugs, extended days on mechanical ventilation [22, 23], longer stay in the PICU, primary and secondary infections [24, 25], myocardial depression, kidney failure that requires dialysis, neurological sequelae at discharge, etc.[17].

Mortality rates in PICUs, according to reports, have been significantly reduced over the last decades [1–3]. This is the result of the achieved development and better organization of these units, due to the preferred centralization of the PICU, medical and technological progress and specialized training of medical professionals for pediatric intensive care [4–7]. Our PICU mortality rate was 10.8% for neonates and 6.7% for children over neonatal age.

Today, children who previously would have inevitably died, can survive, thanks to the development and improvement of the PICU. Also, the number of patients in the PICU, who previously would not have been considered for admission, due to their extreme immaturity or complex chronic diseases is increasing [5-7]. In addition to prematurity, chronic diseases and complications were one of the most common causes of PICU admission and mortality in our study also. Age and severity of the disease were the strongest predictors of fatal outcome. Premature neonates ended fatally more often, and of all children over neonatal age, younger infants had a fatal outcome more often. Non-survival group our patients had a statistically significantly lower gestational age in neonates and a younger chronological age in the pediatric patient group, which is partly consistent with the published results [12-15].

Evaluation of the outcome of children treated in the PICU is very delicate. These are children in a life-threatening condition, with associated risk factors for an adverse outcome. Recently, scoring systems have been created to assess the severity of the disease, adapted to neonatal [8] and pediatric intensive care units [9-11]. The CRIB II and SNAPE-PE scoring systems are most often used in neonates, and the PRISM score is most often used in older children [16-19]. In our study non-survival group had worse results of all scoring systems.

These tools not only assess the severity of the disease, but also have a certain predictive value, related to the outcome. Proven predictors of an adverse outcome for neonates are prematurity and low birth weight, while scoring systems for older children mainly assess the degree of respiratory, circulatory and neurological dysfunction, and thereby assess the degree of instability and life-threatening. However, it should be emphasized that these scoring systems have research value and should not be decisive in making clinical choices for individual patients. In the treatment of patients in the ICU, a systematic, structured multidisciplinary approach, and comprehensive continuous assessment and support is preferred. Adverse outcomes, however unwanted, are sometimes unavoidable.

CONCLUSION

In the past decade in our centre there has been a trend of a decrease in the number of total hospital admissions, but with a simultaneous increase in admissions to the PICU to 15% of all hospitalizations. The greatest changes were recorded for neonates. Although there is a constant trend of decreasing the number of live births, at the same time, an increase in the prematurity rate was recorded up to 10.4%. In the observed period, the number of neonates admitted to our PICU increased significantly, especially premature ones, without gender differences. Respiratory failure was the most common in the morbidity profile and the need for mechanical ventilation, in all age groups, most pronounced in neonates, especially premature ones. The morbidity profile was age-specific. In neonates, prematurity and respiratory pathology were the most common, in infants, additionally, infections and congenital anomalies, and in children > 1.0 years, also trauma and chronic diseases. Morbidity profile during intensive treatment was often further complicated with development of multisystem organ dysfunction and other complications, which required additional complex interventions, extended days on mechanical ventilation, longer stay in the PICU, primary and secondary infections, myocardial depression, kidney failure that required dialysis, neurological sequelae at discharge, etc. Lower gestational age, younger chronological age and severity of the disease were the strongest predictors of fatal outcome.

Today, pediatric intensive care units are multidisciplinary and interprofessional, specialized and technologically equipped, dedicated to the treatment of patients with potential or already evident, life-threatening organ function disorders. Patient outcomes in pediatric intensive care units are a constant challenge, which requires a permanent search for improvement, development and strengthening of all resources.

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