

# 23. ULUSAL KONGRESİ

Göğüs Kalp Damar Anestezi ve Yoğun Bakım Derneği

25-28 Mayıs 2017  
Marriot Hotel Asia  
İSTANBUL

## PEDIYATRİK KVC'DE UZAMIŞ YOĞUN BAKIM SÜRECİ

Dr. Nurgül Yurtseven



# SUNUM PLANI

- Tanım
- Risk Faktörleri
- Komplikasyonlar ve Tedavi
- Nazal Yüksek Akış Oksijen Tedavisi



# KRONİK KRİTİK HASTALIK VEYA UZAMIŞ YOĞUN BAKIM SÜRESİ

- Yoğun Bakım Ünitesinde 28 günden daha fazla kalma

- İnsidans

Pediyatrik hastada %3

Neonatal hastada %7



Chart 1. The risk categories from the stratification of complexity methods with some procedures.

RACHS-1	STS-EACTS (STAT) mortality score	Aristotle basic score
Category 1 PDA>30d, OS ASD, sinus venosus septal defect, aortic coarctation>30d, PAPVC	Category 1 ASD, VSD, Fontan (lateral tunnel, fenestrated), aortic coarctation repair (end to end), TOF repair (no TAP)	Category 1 ASD repair, AVSD repair (intermediate and partial), PDA, PAPVC repair
Category 2 VSD, TOF, Glenn, OP ASD, aortic coarctation at age≤30d, ASD and VSD, repair of total anomalous pulmonary veins at age >30d	Category 2 PDA, mitral plasty, Glenn, TOF (TAP), Fontan (external conduit, fenestrated)	Category 2 VSD, Glenn, Systemic to pulmonary shunt (MTBS and central), TOF (ventriculotomy, non-TAP)
Category 3 Fontan procedure, Systemic to pulmonary artery shunt, mitral valvotomy or valvuloplasty, MVR, PA banding	Category 3 Arterial switch operation, coarctation repair (patch aortoplasty), AVSD repair (complete), coarctation repair + VSD repair, Rastelli.	Category 3 TOF (TAP), Fontan, TAPVC repair, mitral valvuloplasty, MVR
Category 4 Arterial switch operation with VSD closure, atrial septectomy, repair of total anomalous pulmonary veins at age ≤30d	Category 4 Arterial switch operation and VSD repair, Arterial switch procedure + aortic arch repair, PA banding, systemic-pulmonary shunt (MBTS or central), MVR, TOF-AVSD repair	Category 4 Senning, ASO, ASO and VSD, DORV (intraventricular tunnel repair), Rastelli, Norwood
Category 5 Repair of truncus arteriosus and interrupted arch, tricuspid valve repositioning for neonatal Ebstein anomaly at age ≤30d	Category 5 Norwood procedure, Damus-Kaye-Stansel procedure	
Category 6 Norwood operation, Damus-Kaye-Stansel procedure		

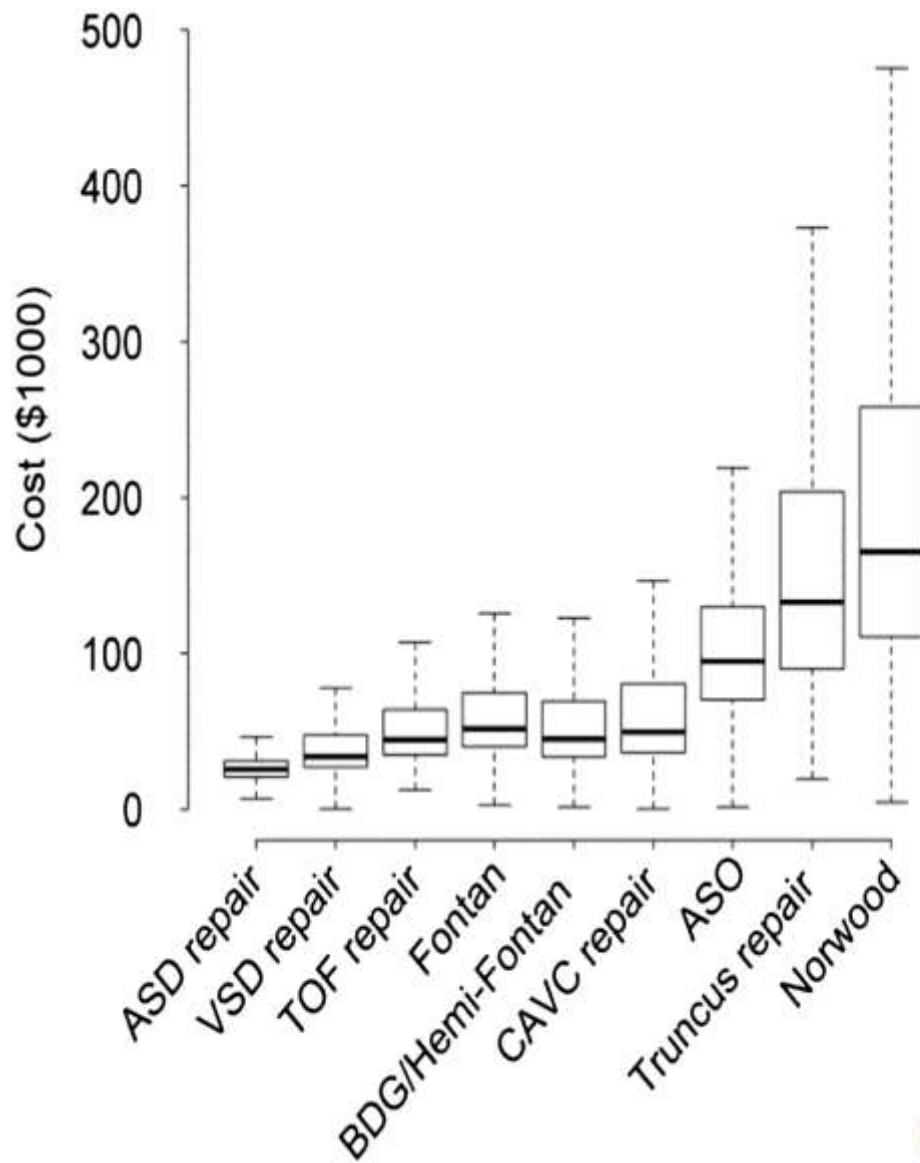
*PDA=patent ductus arteriosus; OS ASD=ostium secundum atrial septal defect; PAPVC=partial anomalous pulmonary venous connection; VSD=ventricular septal defect, TOF=tetralogy of Fallot; OP ASD=ostium primum atrial septal defect; MVR=mitral valve replacement, PA=pulmonary artery; TAP=transannular patch; AVSD=atrioventricular septal defect; MBTS=modified Bialock-Taussig shunt; TAPVC=total anomalous pulmonary venous connection; ASO=arterial switch operation; DORV=double-outlet right ventricle*

## STS Congenital Heart Surgery Morbidity Score

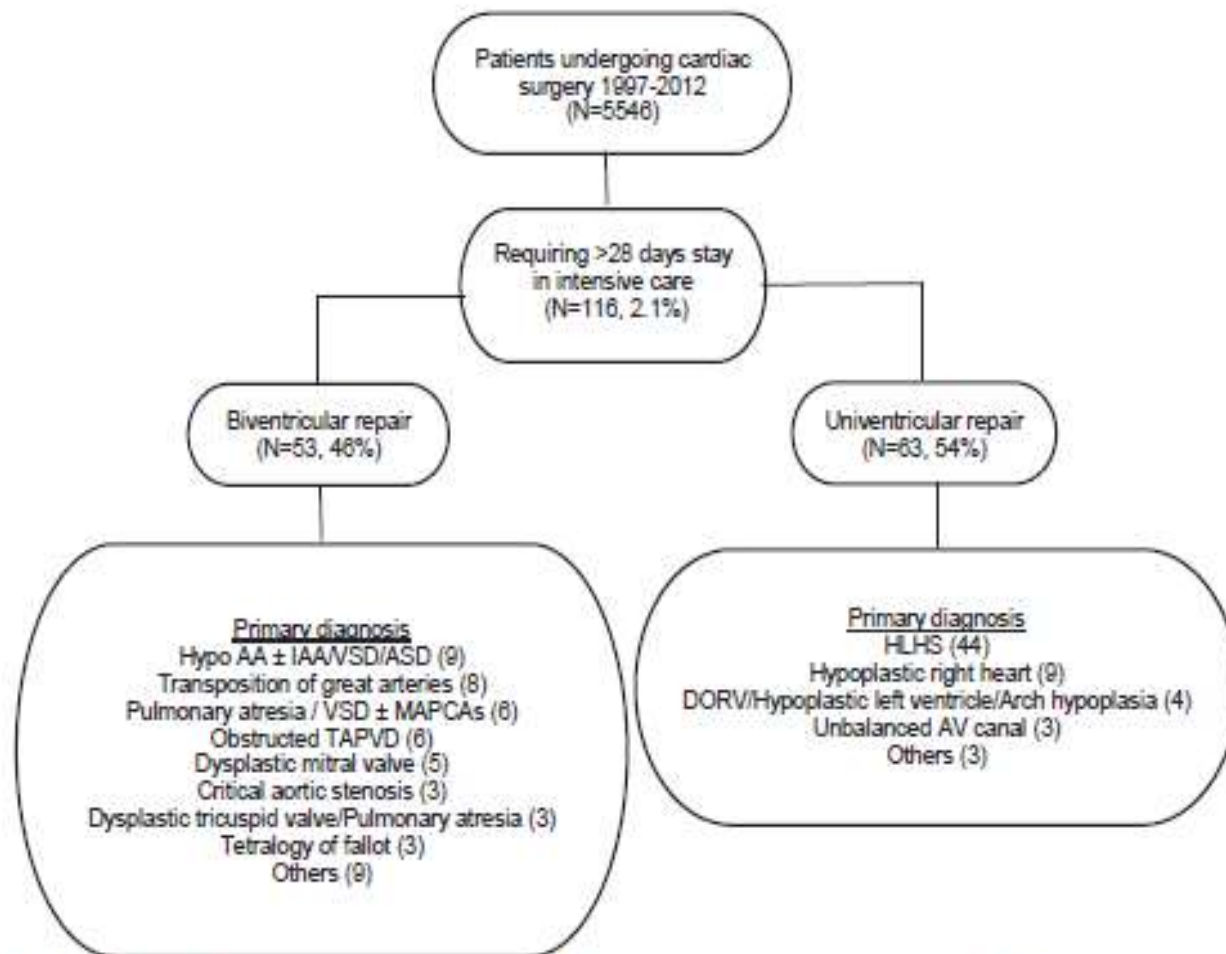
	1	2	3	4	5
No. of procedures	36	43	36	21	4
Aggregate average PLOS (d)	6.3	11.3	15.2	22.3	34.0
Rate of major complications	3.2%	6.5%	11.9%	15.2%	30.0%

*PLOS*, Postoperative length of stay.



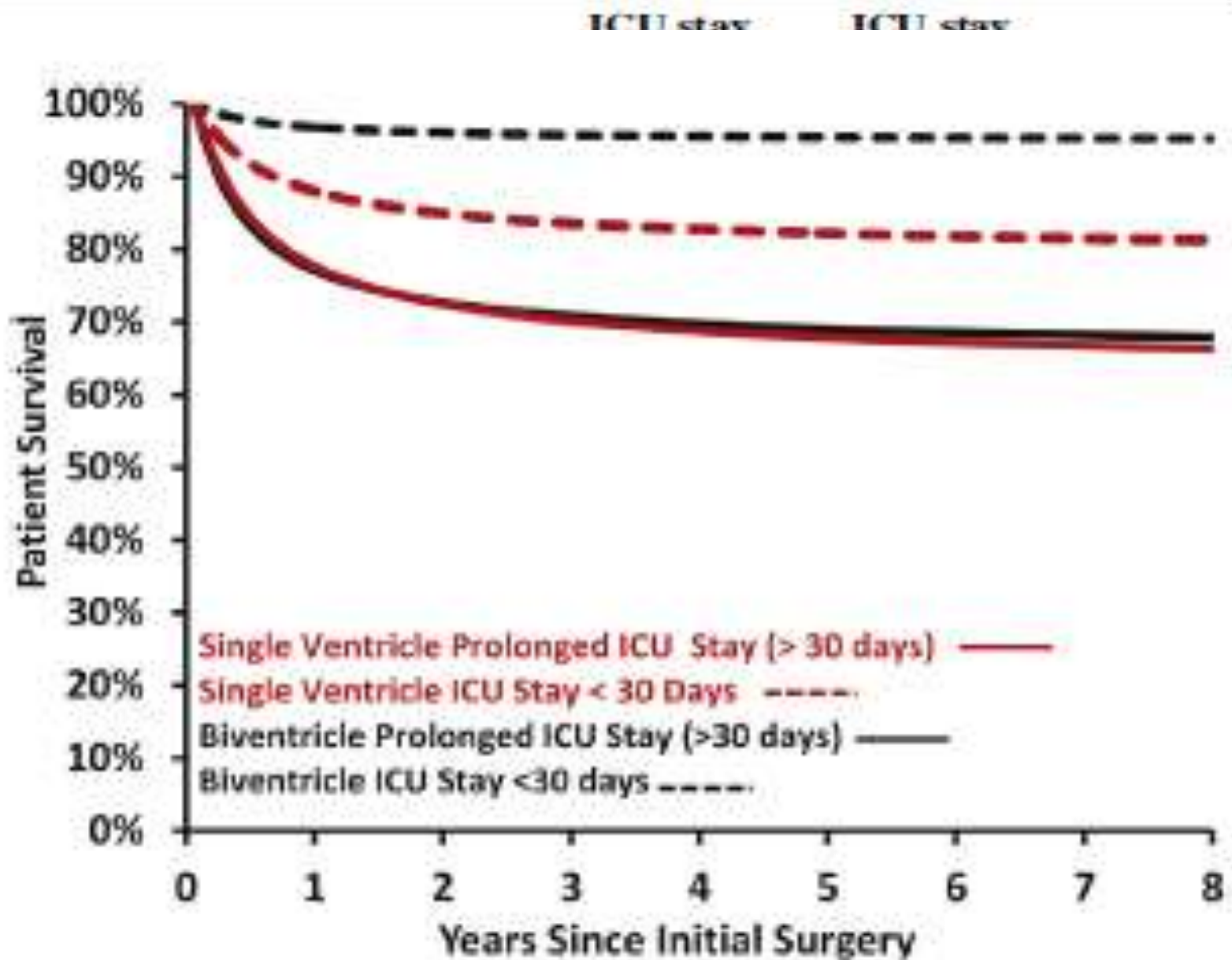


Operation	Median cost/case (IQR)
ASD repair	\$25,499 (20,645–30,962)
VSD repair	\$33,679 (26,915–47,381)
TOF repair	\$44,318 (34,743–63,808)
Fontan	\$51,464 (39,976–74,640)
BDG/Hemi-Fontan	\$44,893 (33,695–69,400)
CAVC repair	\$49,445 (36,293–80,545)
ASO	\$94,902 (70,357–129,984)
Truncus repair	\$133,006 (90,189–204,006)
Norwood	\$165,168 (110,446–257,980)

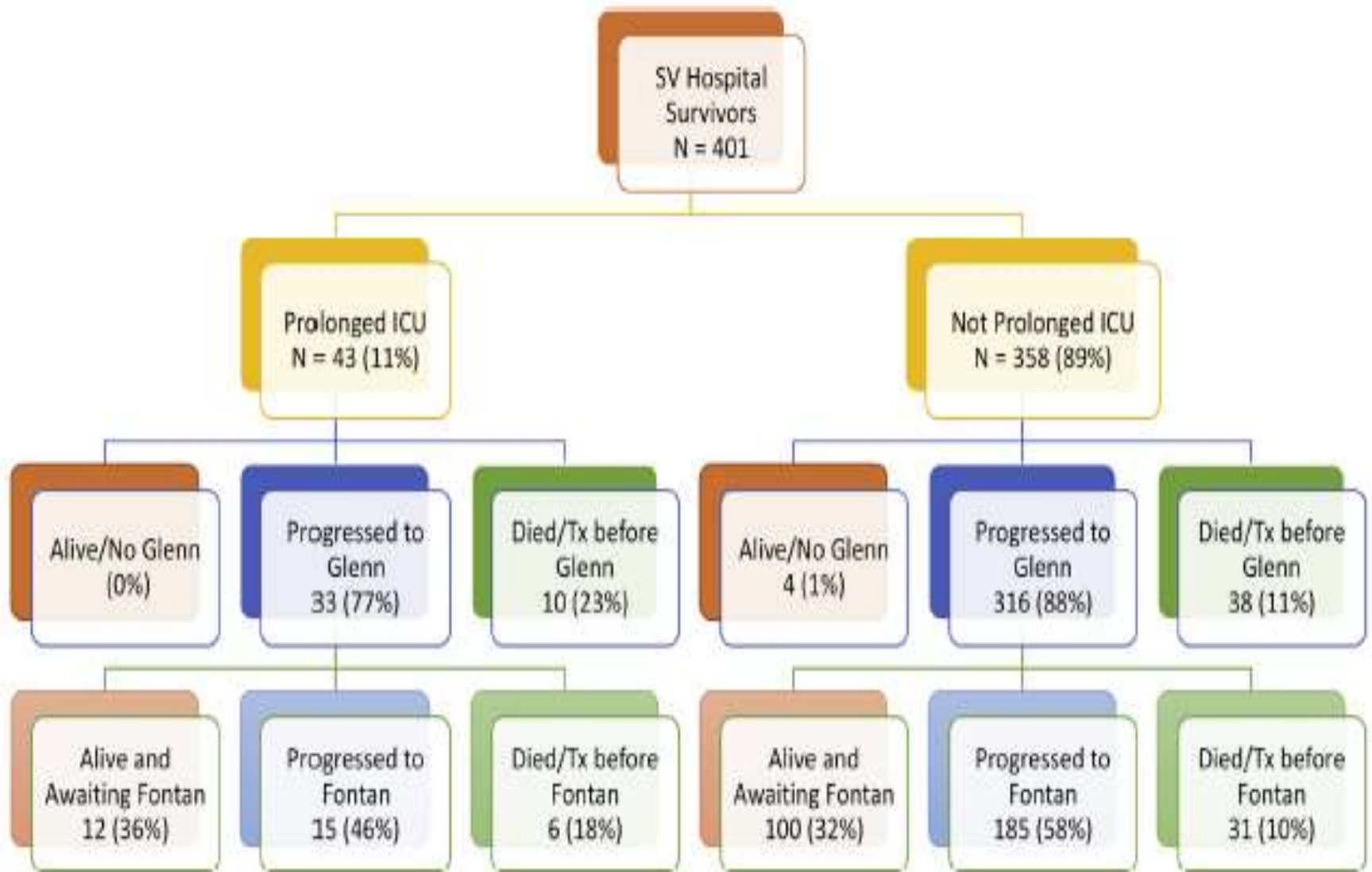


**FIGURE 1.** Flow chart of study patients with underlying diagnoses. AA, Aortic arch; IAA, interrupted aortic arch; VSD, ventricular septal defect; ASD, atrial septal defect; MAPCAs, major aortopulmonary collaterals; TAPVD, total anomalous pulmonary venous drainage; HLHS, hypoplastic left heart syndrome; DORV, double outlet right ventricle; AV, atrioventricular.









# KARDİYAK CERRAHI SONRASI 693 HASTA 172 NEONATAL, 357 INFANT, 163 ÇOCUK HASTA

Table 1. Potential perioperative risk factors and intensive care unit length of stay (days). Univariate analysis. Summary.

Risk factor (RF)	ICULOS of patients without RF			ICULOS of patients with RF			p value	IR
	Mean	SD	N	Mean	SD	N		
Prematurity	6.17	12.26	683	13.40	19.79	10	0.07	
Mechanical ventilation prior to surgery	5.99	11.94	679	20.14	23.67	14	0.00*	3.36
Myocardial dysfunction prior to surgery	6.14	12.11	686	19.57	28.78	7	0.00*	3.19
Chromosomal abnormality	6.14	12.49	641	7.94	11.55	50	0.32	
Cardiac arrest	5.83	11.89	663	16.10	18.61	30	0.00*	2.76
Sternum left open	5.93	12.42	666	14.85	8.77	27	0.00*	2.50
LCOS	5.53	12.26	627	13.38	11.65	66	0.00*	2.41
Arrhythmia	6.19	12.52	672	9.00	7.94	21	0.31	
Bleeding	5.94	12.21	655	12.41	14.62	37	0.00*	2.08
Pneumonia	5.52	11.68	652	18.34	16.96	41	0.00*	3.32
Acute kidney injury	5.99	12.13	678	19.13	18.05	15	0.00*	3.19
Pneumothorax	5.81	10.51	673	22.05	37.94	20	0.00*	3.79
Pulmonary hypertension	6.05	12.15	680	18.23	19.53	13	0.00*	3.01
Respiratory insufficiency	5.11	9.39	664	33.00	30.80	29	0.00*	6.45
Sepsis	5.96	12.02	678	20.67	20.16	15	0.00*	3.47
Reoperation	5.84	11.47	675	22.72	27.60	18	0.00*	3.89

ICULOS: intensive care unit length of stay; RF: risk factor; SD: standard deviation; N: number of patients; LCOS: low cardiac output syndrome. \* indicates  $p < 0.05$ . IR – incidence ratio: quotient of mean time of ICULOS with risk factor divided by mean ICULOS without risk factor.

# POZİTİF SIVI BALANSI

	<10% Fluid Overload	≥10%-20% Fluid Overload	≥20% Fluid Overload	Total Cohort	<i>p</i>
No. of patients	153	51	93	297	
PICU length of stay (d)	15.7 ± 17.1	24.8 ± 30.0	29.5 ± 36.9	21.6 ± 27.6	<0.001
Mortality (%)	29.4	43.1	65.6	43.1	<0.001
Age (y)	10.4 ± 7.0	7.5 ± 6.8	6.1 ± 6.2	8.5 ± 7.0	<0.001
Weight (kg)	43.4 ± 32.1	29.1 ± 23.2	22.1 ± 23.1	34.3 ± 29.7	<0.001
Sex (%)					
Male	62.1	54.9	54.8	58.6	0.5
Female	37.9	45.1	45.2	41.4	
MODS diagnosis (%)	64.7	86.3	96.8	78.5	<0.001
Intubated	59.5	88.2	91.4	74.4	<0.001
Requiring ≥ 1 inotrope	49.7	76.5	80.7	64.0	<0.001
Requiring ≥ 2 inotropes	26.8	43.1	58.1	39.4	<0.001
eGFR < 60 mL/min/1.73 m <sup>2</sup>	78.4	74.5	89.3	81.1	0.05
eGFR < 30 mL/min/1.73 m <sup>2</sup>	49.0	47.1	58.1	51.1	0.3
Sepsis (%)	24.8	37.3	40.9	32.0	0.02
Oncologic process (%)	30.1	21.6	15.1	23.9	0.03
Inborn error of metabolism or intoxication diagnosis (%)	10.5	2.0	1.1	6.1	0.005
PRISM II score at PICU admission	13.1 ± 8.5	15.1 ± 7.9	15.9 ± 10.1	14.3 ± 9.0	0.04
Inotrope no. at CRRT initiation	0.9 ± 1.1	1.4 ± 1.0	1.7 ± 1.2	1.2 ± 1.2	<0.001
eGFR at CRRT initiation (mL/min/1.73 m <sup>2</sup> )	47.5 ± 51.0	44.4 ± 33.0	33.9 ± 23.9	42.8 ± 41.6	0.05
CRRT indications included fluid overload (%)	69.3	82.4	88.2	77.4	0.002
CRRT modality (%)					0.04
Convective	60.1	49.0	44.1	53.2	
Diffusive	39.9	51.0	55.9	46.8	

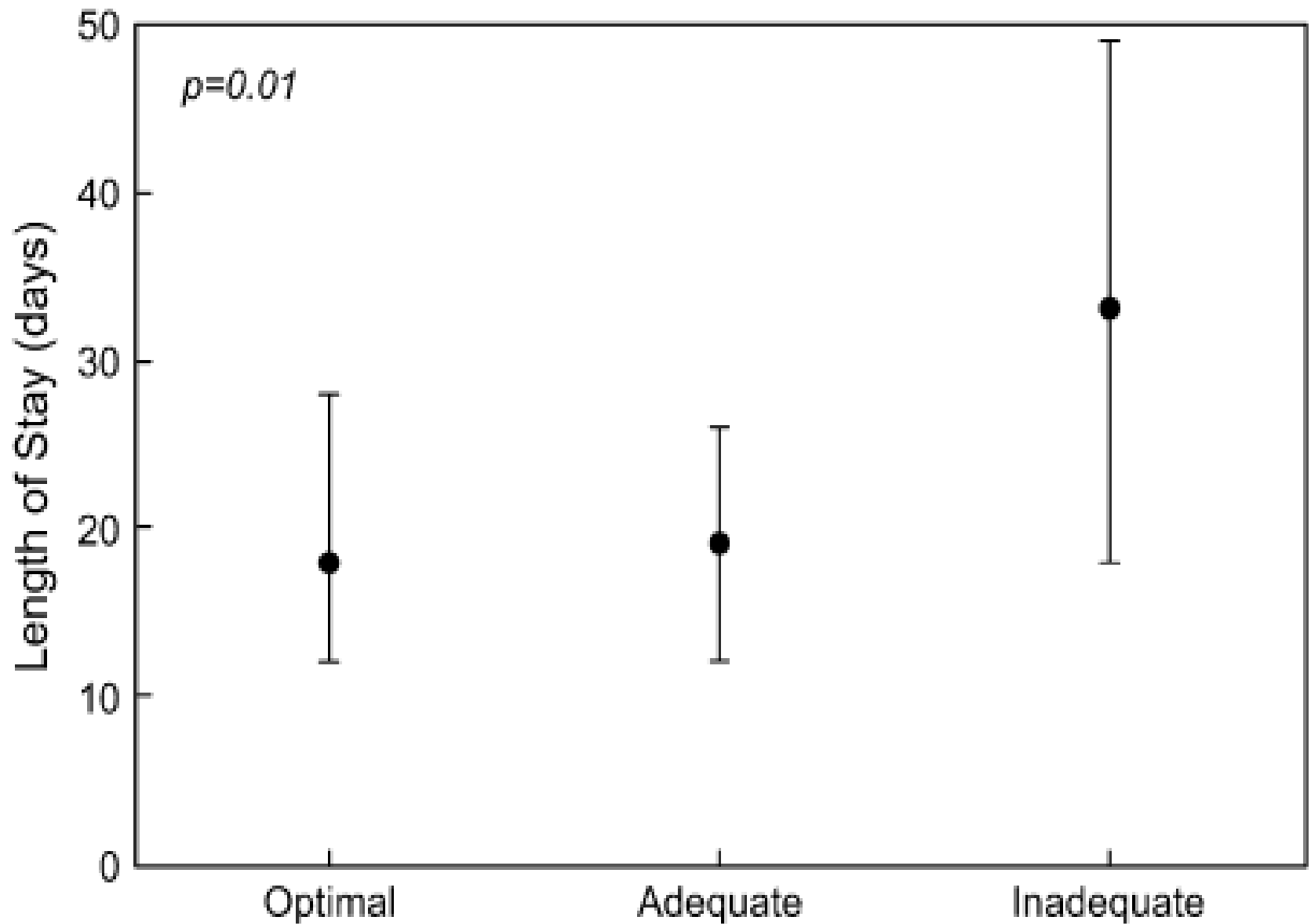


# 325 HASTA %40 EN AZ 1 KOMPLIKASYON

TABLE 6. Study of cardiopulmonary bypass parameters and complications with mechanical ventilation duration and pediatric intensive care unit stay

Risk factor	Mechanical ventilation duration		PICU stay	
	Ratio of geometric mean (95% CI)	<i>P</i> value*	OR (95% CI)	<i>P</i> value†
Age (y)	0.99 (0.97-1.03)	.84	0.99 (0.92-1.07)	.86
Gender (male vs female)	1.02 (0.83-1.26)	.84	1.28 (0.75-2.2)	.36
Previous surgery (yes vs no)	0.82 (0.57-1.18)	.3	0.49 (0.18-1.32)	.16
Single-ventricle physiology	1.32 (0.88-1.97)	.18	1.96 (0.68-6.6)	.21
RACHS-1 category		.24‡		.003‡
2	1.18 (0.77-1.79)		1.98 (0.59-6.59)	
3	1.75 (1.09-2.82)		4.37 (1.16-16.41)	
4	2.39 (1.39-4.10)		12.47 (2.70-57.14)	
5-6	2.00 (1.03-3.91)		6.94 (1.17-41.2)	
CPB time (h)	1.11 (0.94-1.31)	.20	2.16 (1.41-3.32)	<.001
Crossclamp time (min)	1.00 (0.99-1.01)	.86	0.99 (0.98-1.01)	.63
Lowest temperature during CPB (°C)	0.97 (0.94-1.01)	.13	0.94 (0.86-1.03)	.19
Lowest hematocrit during CPB	1.01 (0.99-1.04)	.25	1.05 (0.98-1.11)	.15
Heparin (U/kg)	1.00 (0.99-1.00)	.48	1.00 (0.99-1.00)	.91
Post-CPB temperature (°C)	1.00 (0.99-1.00)	.83	1.00 (0.99-1.00)	.63
Complications (yes vs no)	1.38 (1.10-1.74)	.006	2.51 (1.41-4.45)	.002

PICU, Pediatric cardiac intensive care unit; CI, confidence interval; OR, odds ratio; RACHS-1, Risk Adjusted Classification for Congenital Heart Surgery, version 1; CPB, cardiopulmonary bypass. \**P* value determined using linear regression analysis. †*P* value determined using proportional odds logistic regression analysis. ‡*P* value determined according to RACHS-1 levels analyzed as categorical variables comparing each category with RACHS-1 category 1.



BI, Blalock–Tausig; RV-PA, right ventricle–pulmonary artery. Reexploration for bleeding does not count as reintervention (ie, not coded as “inadequate”).

# DÜŞÜK KARDİYAK OUTPUT

CI < 2L/MIN/M<sup>2</sup> , İNSİDANS 25%

## ○ İNTRAOPERATİF

Cerrahi ve Ekstrakorporeal dolaşıma yanıt

## ○ RESİDÜEL VOLÜM YÜKÜ

Atrium veya Ventrikül seviyesinde intrakardiyak şant veya PDA

## ○ BASINÇ YÜKÜ

Stenotik kapak veya konduit varlığı

SVR veya PVR'de değişimler





# Efficacy and Safety of Milrinone in Preventing Low Cardiac Output Syndrome in Infants and Children After Corrective Surgery for Congenital Heart Disease

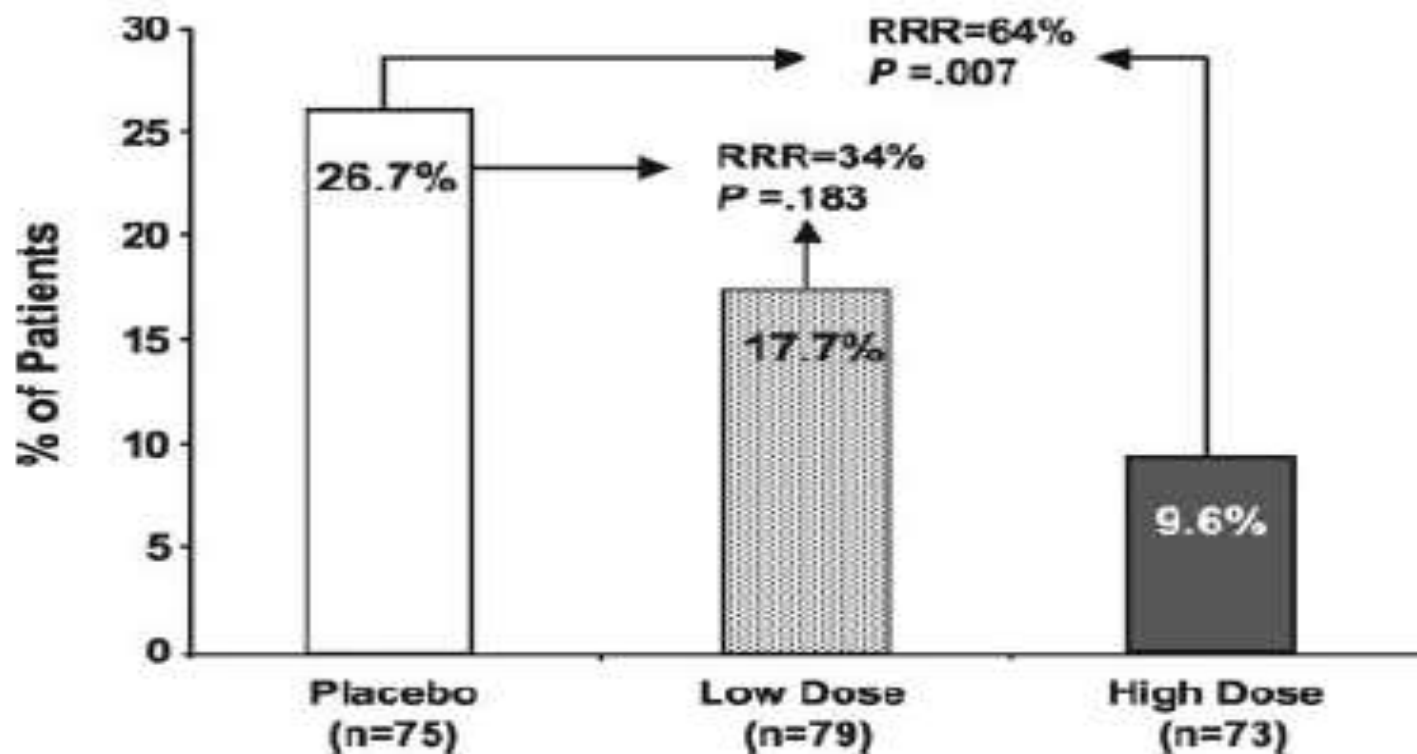


Figure 2. Primary end point: development of LCOS/death in the first 36 hours (per-protocol population, n=227).

# ECMO

TABLE 2  
Univariate and multivariable analysis of risk factors.

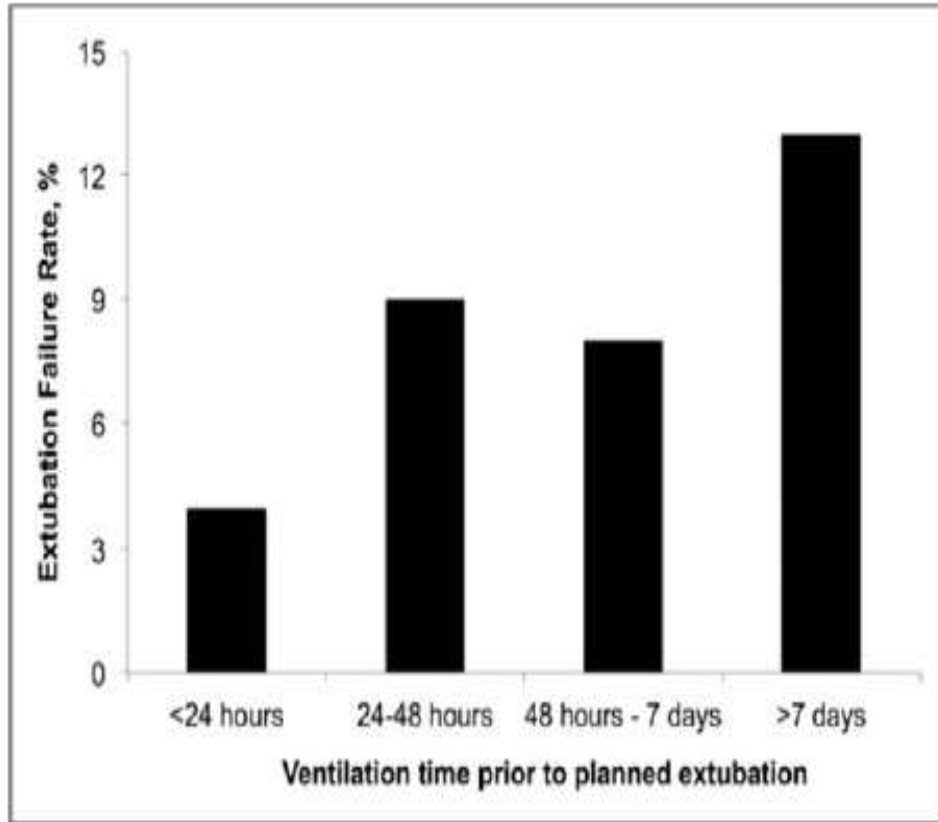
	Univariate analysis		Multivariable analysis	
	OR (95% CI)	p	OR (95% CI)	p
Age	1.06 (0.96–1.16)	0.28		
Weight	1.02 (0.99–1.05)	0.25		
Male gender	0.59 (0.32–1.08)	0.09		
Single ventricle	0.61 (0.33–1.14)	0.12	0.47 (0.22–0.96)	0.04
ECMO started in OR	0.85 (0.47–1.56)	0.62		
ECPR	0.63 (0.32–1.24)	0.18		
ECMO duration	1.09 (1.00–1.19)	0.05	1.19 (1.06–1.33)	0.003
Surgical revision	2.19 (0.96–4.97)	0.07		
ECMO exit by OHTX	0.36 (0.14–0.93)	0.04	0.28 (0.09–0.93)	0.04
Repeat ECMO run	12.0 (1.56–92.2)	0.02	13.6 (1.6–113.6)	0.02
Mechanical complications	0.88 (0.47–1.63)	0.68	0.43 (0.19–0.96)	0.04
Bleeding complications	1.92 (1.04–3.53)	0.04		
Neurological complications	7.57 (2.21–26.0)	0.002	14.4 (3.05–68.0)	0.0007
Renal dysfunction	5.47 (1.22–24.6)	0.03	5.07 (1.03–24.95)	0.04
Pulmonary hemorrhage	5.15 (0.63–42.2)	0.13		

# POSTOPERATIF RISK FAKTÖRLERİ

Risk factor	p	OR	-95%CI	+95%CI
LCOS	0.00	7.21	4.02	12.95
Postoperative cardiac arrest	0.00	5.01	2.25	11.23
Sternum left open	0.00	11.71	5.26	26.19
Bleeding	0.00	4.93	2.28	9.91
Pneumonia	0.00	1.16	3.13	12.52
AKI	0.00	11.31	3.98	32.36
Pneumothorax	0.00	6.55	2.28	9.91
Pulmonary hypertension	0.00	8.22	2.69	25.30
Respiratory insufficiency	0.00	32.95	13.88	78.23
Sepsis	0.00	6.37	2.21	18.55
Reoperation during the same admission	0.00	7.88	3.01	20.78
Mechanical ventilation prior to surgery	0.01	5.23	1.71	16.13
Myocardial dysfunction prior to surgery	0.02	6.89	1.52	31.62

An odds ratio greater than one implies that the patient exposed to a risk factor is more likely to have ICULOS >3 days. ICULOS: intensive care unit length of stay; LCOS: low cardiac output syndrome; AKI: acute kidney injury; p: probability; OR: odds ratio; CI: confidence interval.

## Clinical Epidemiology of Extubation Failure in the Pediatric Cardiac ICU: A Report From the Pediatric Cardiac Critical Care Consortium

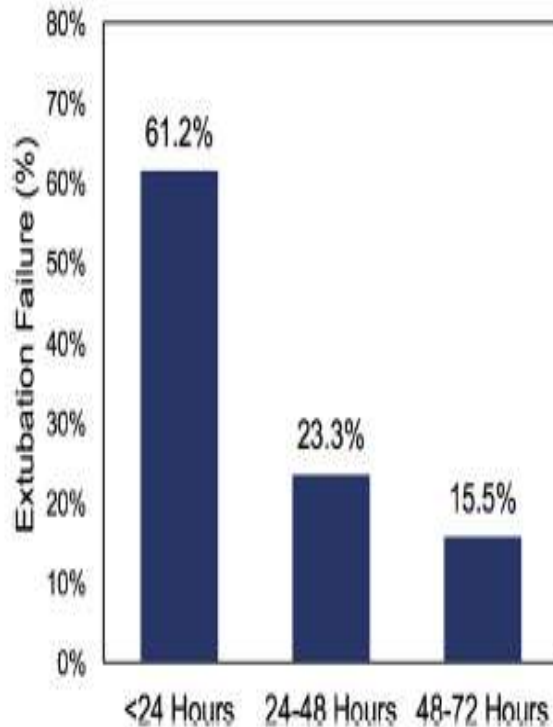


### Risk Faktörleri

- Mekanik ventilasyon süresi >24 h
- Neonatal hastalar
- Komplike cerrahi girişim
- Cerrahi dışı nedenler
- Yeni vokal kord disfonksiyonu

# Variation in extubation failure rates after neonatal congenital heart surgery across Pediatric Cardiac Critical Care Consortium hospitals

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	Relative risk ratios (95% CI)	
	Early (<24 h)	Late (24-72 h)
Airway anomaly	4.65 (2.59-8.36)*	3.12 (1.17-8.32)*
Male gender	1.94 (1.18-3.18)*	0.87 (0.52-1.44)
Society of Thoracic Surgeons-European Association for Cardio-Thoracic Surgery Congenital Heart Surgery mortality category		
Categories 1-3	ref	ref
Categories 4-5	1.47 (0.72-3.00)	1.19 (0.69-2.04)
Pre-extubation extracorporeal life support	1.77 (0.58-5.46)	1.76 (0.46-6.71)
Use of inhaled nitric oxide	1.40 (0.81-2.40)	2.00 (1.06-3.76)*
Total mechanical ventilation (stratified into quartiles)		
≤25 h	ref	ref
26-70 h	1.29 (0.68-2.47)	0.85 (0.41-1.80)
70-144 h	1.06 (0.67-1.68)	1.08 (0.33-3.54)
>144 h	1.42 (0.85-2.36)	1.38 (0.51-3.77)

Reference group is no extubation failure. Clustering of patients at the same center were accounted for in the generalized logit regression model. CI, Confidence interval. \*P < .05.

899 NEONATAL HASTADA 103 EKSTÜBASYON BAŞARISIZLIĞI(% 11)



# Extubation Failure after Neonatal Cardiac Surgery: A Multicenter Analysis

**Table IV. Perioperative and ICU admission data**

Variables	All patients (N = 283)	Extubation success (n = 248)	Extubation failure (n = 35)	Pvalue
<b>Endotracheal tube characteristics</b>				
Diameter, mm/m <sup>2</sup>	15.4 ± 2.2	15.3 ± 2.2	16.3 ± 2.2	.014
Uncuffed, n	49 (17%)	37 (15%)	12 (34%)	.005
<b>Operative data</b>				
STAT Mortality Category 4 or 5, n	190 (67%)	168 (68%)	22 (63%)	.57
Cardiopulmonary bypass, n	219 (77%)	194 (78%)	25 (71%)	.37
Cardiopulmonary bypass, min	132 (51, 189)	132 (60, 193)	134 (0, 170)	.48
Aortic cross clamp, min	52 (16, 91)	51 (18, 93)	57 (0, 78)	.36
DHCA, n	68 (24%)	58 (23%)	10 (29%)	.50
ACP, n	83 (29%)	69 (28%)	14 (40%)	.14
DHCA and ACP, n	36 (13%)	28 (11%)	8 (23%)	.10
Corticosteroids, n	211 (75%)	187 (66%)	24 (69%)	.39
Delayed sternal closure, n	94 (33%)	78 (31%)	16 (46%)	.09
Delayed sternal closure, d	0 (0, 2)	0 (0, 1)	0 (0, 4)	.015
Delayed sternal closure ≥4 d, n	31 (11%)	20 (8%)	11 (31%)	<.001
ECMO, n	15 (5%)	10 (4%)	5 (14%)	.03
Clinically relevant residual lesion, n	48 (17%)	41 (17%)	7 (20%)	.61
<b>Postoperative admission data</b>				
pH	7.35 ± 0.08	7.35 ± 0.08	7.33 ± 0.07	.09
Lactate, mg/dL	3.7 ± 2.6	3.6 ± 2.4	4.7 ± 3.5	.021
Peak inspiratory pressure, mm Hg	22 ± 5	22 ± 5	23 ± 5	.11
PEEP, mm Hg	5 ± 1	5 ± 1	6 ± 1	.10
Dynamic compliance, mL/cmH <sub>2</sub> O/kg	0.6 ± 0.2	0.6 ± 0.2	0.5 ± 0.2	.67
VI	19 (14, 25)	18 (14, 25)	21.1 (16, 26)	.26
VIS	8 (5, 11)	8 (5, 11)	8 (0, 13)	.51

Ekstübasyon Başarısızlığı %12



**TABLE 4. Risk factors associated with need for reintubation after pediatric heart surgery in multivariable models**

Variable	Comparison	Odds ratio (95% CI)	P value
Male gender	Yes vs No	1.04 (0.93-1.16)	.55
Age	12-mo increase	0.89 (0.86-0.92)	<.0001
Weight-for-age Z-score	1 SD increase	0.92 (0.88-0.96)	<.0001
Genetic disorder	Yes vs No	1.45 (1.30-1.62)	<.0001
Low birth weight	Yes vs No	0.98 (0.78-1.21)	.91
Pulmonary hypertension	Yes vs No	1.31 (1.08-1.63)	.005
High complexity operations	Yes vs No	1.64 (1.44-1.85)	<.0001
Need for reoperation	Yes vs No	4.54 (3.94-5.28)	<.0001
PIM-2 score	0.5-unit increase	1.17 (1.14-1.21)	<.0001
Cardiac arrest	Yes vs No	1.70 (1.36-2.19)	<.0001
Acute lung injury	Yes vs No	1.64 (1.49-1.79)	<.0001
Chylothorax	Yes vs No	2.22 (1.64-3.05)	<.0001
Diaphragm paralysis	Yes vs No	4.69 (3.88-5.72)	<.0001
Brain hemorrhage	Yes vs No	0.88 (0.42-1.45)	.54
Renal failure	Yes vs No	1.06 (0.82-1.32)	.79
Seizures	Yes vs No	1.83 (1.41-2.32)	<.0001
Sepsis	Yes vs No	2.35 (1.47-3.34)	<.0001
Use of HFOV	Yes vs No	27.17 (17.73-48.18)	<.0001
Use of ECMO	Yes vs No	0.96 (0.75-1.17)	.65
Extubated in operating room	Yes vs No	2.76 (2.31-3.23)	<.0001
Duration of MV	2-d increase	1.04 (1.02-1.06)	<.0001
Annual cardiac surgery per center	100-case increase	1.03 (0.99-1.08)	.16
Cardiac ICU	Yes vs No	0.78 (0.66-0.90)	.005

High-complexity operations: Society of Thoracic Surgeons–European Association for Cardiothoracic Surgery surgical risk categories 4 and 5. *CI*, Confidence interval; *PIM-2*, Pediatric Index of Mortality; *HFOV*, high-frequency oscillatory ventilation; *ECMO*, extracorporeal membrane oxygenation; *MV*, mechanical ventilation; *ICU*, intensive care unit.

# NAZAL YÜKSEK AKIŞ OKSİJEN

Havayolu açık hastada ısıtılmış ve nemlendirilmiş oksijen karışımının nazal kanül yoluyla doğrudan burun deliklerine verilmesi işlemi



## nCPAP

- Kapalı
- Isıtılmış ve nemlendirilmiş
- Önceden tanımlanmış basınçlar
- Tipik 6-10 L/m akış



## NHFO

- Açık
- Isıtılmış ve nemlendirilmiş
- Akış kapasiteleri:  
Yenidoğanda maks. 8 L/m,  
Pediatrikte maks. 25 L/m



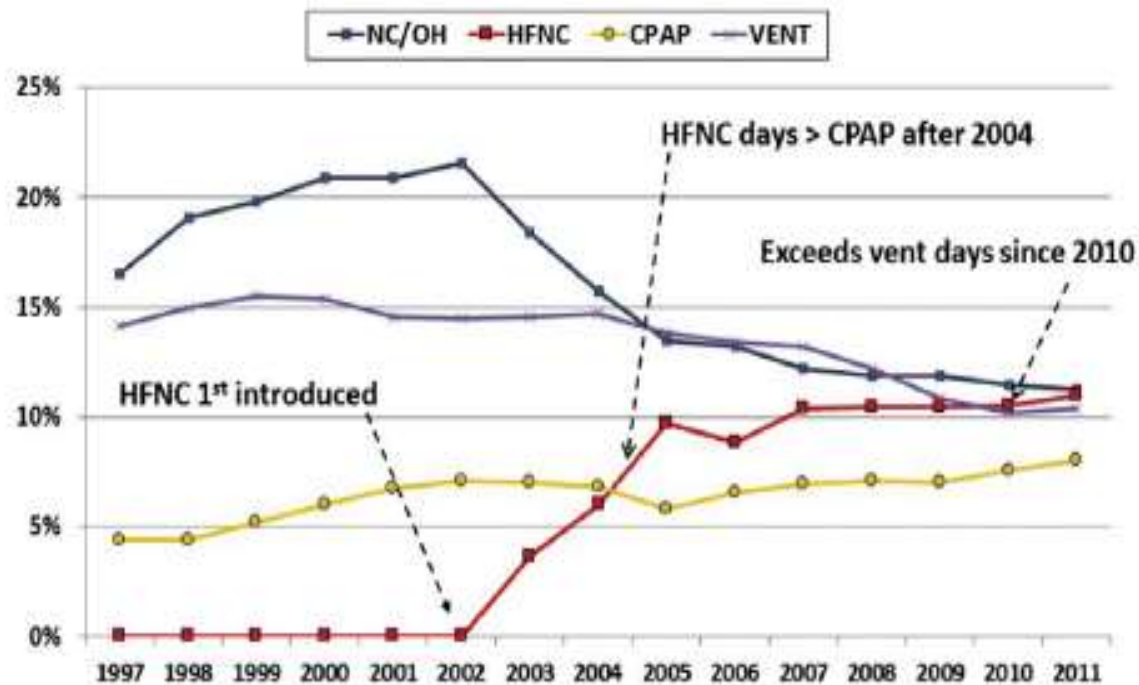
## Oksijen tedavisi

- Açık
- Soğuk, kuru tıbbi gaz
- 2 L/m'den düşük akışlar



# Increasing HFNC Use

All Patients during NICU Stay



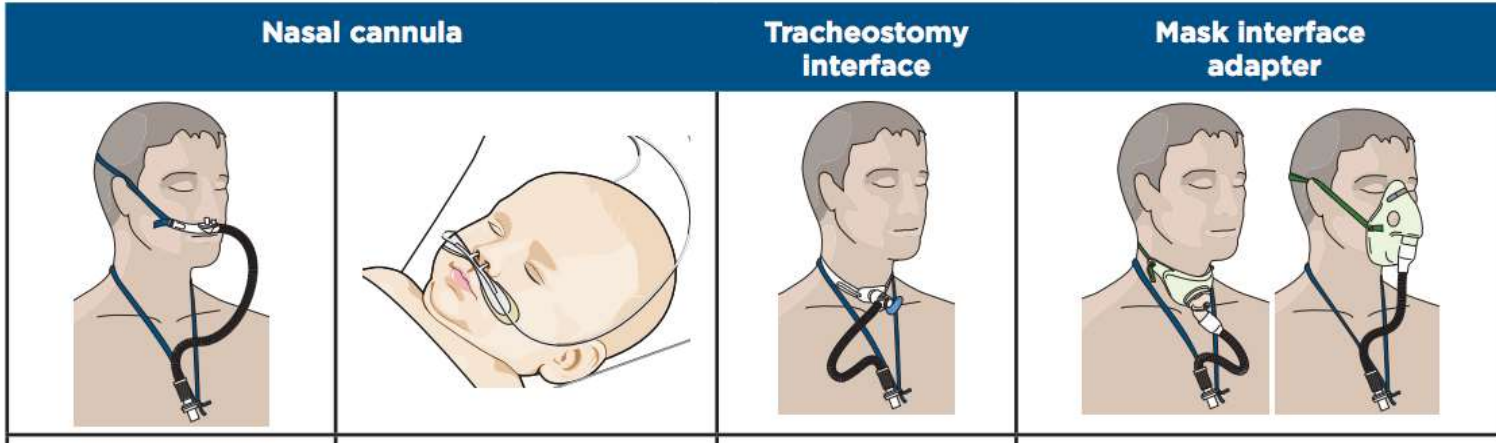
n = 801,143; data courtesy of Dr. Reese Clark, Pediatrix

Fig. 1. Increasing use of nHFT among US-American NICUs. HFNC, high-flow nasal cannula.





# YÜKSEK AKIMLI NAZAL OKSİJEN (HFNO)



# HFOT'un Fizyolojik Etkileri

Anatomik ölü  
boşluğu  
azaltır

Mukosilier  
aktiviteyi  
arttırarak  
sekresyonların  
atılımını artır

İnspiratuar  
direnci  
azaltır

PEEP etkisi  
(Alveolar  
Rekrutment)

FiO2 daha  
rahat  
kontrol  
edilir

Komfor ve  
hasta  
toleransı

NO  
verile  
bilir



# High flow nasal oxygen in acute respiratory failure

J.-D. RICARD 1, 2, 3

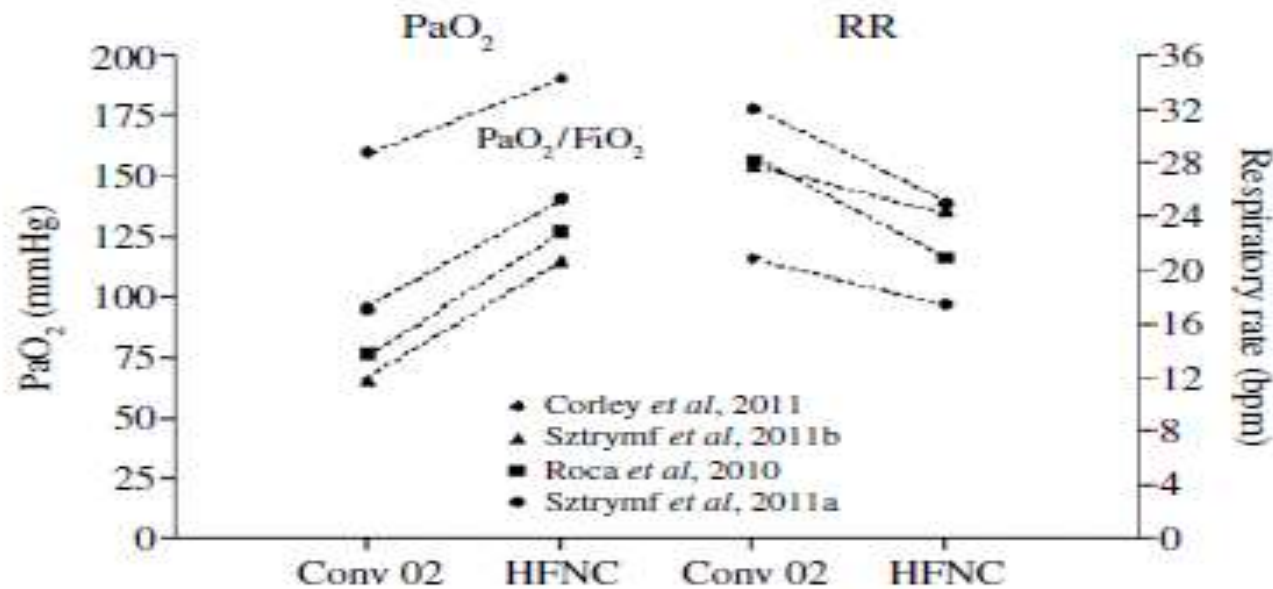


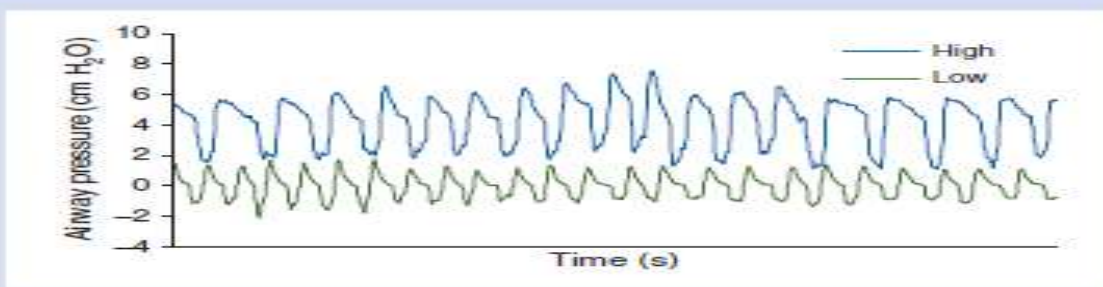
Figure 1.—Differences in PaO<sub>2</sub> (and PaO<sub>2</sub>/FiO<sub>2</sub> in one case) and respiratory rate (RR) in four studies conducted in adults with acute respiratory failure, between conventional facemask oxygen therapy (Conv O<sub>2</sub>) and high flow nasal cannula oxygen (HFNC).

# Oxygen delivery through high-flow nasal cannulae increase end-expiratory lung volume and reduce respiratory rate in post-cardiac surgical patients

A. Corley<sup>1\*</sup>, L. R. Caruana<sup>1</sup>, A. G. Barnett<sup>2</sup>, O. Tronstad<sup>1</sup> and J. F. Fraser<sup>1</sup>

**Table 2** Outcome variables. Low-flow oxygen compared with HFNCs

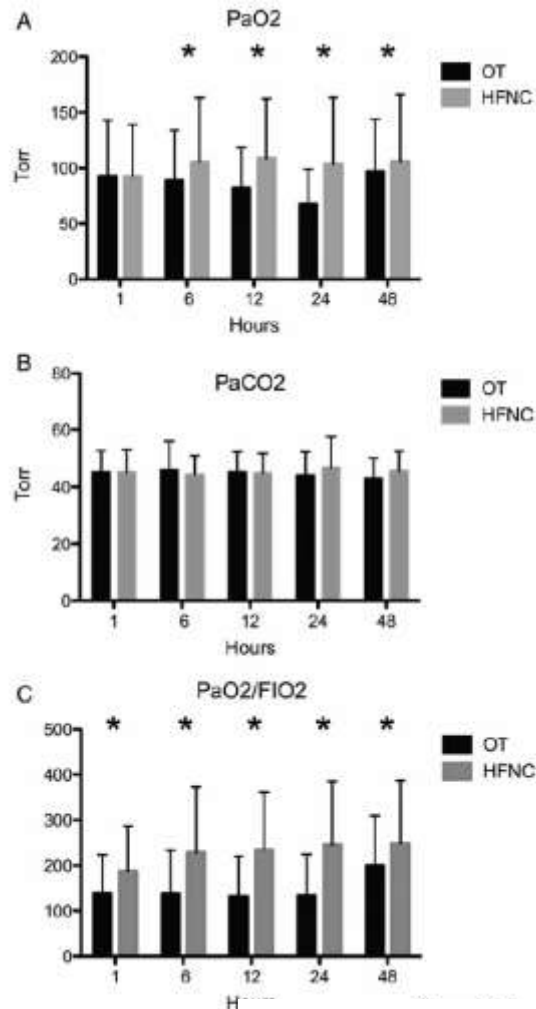
Variable	Low-flow oxygen [mean (sd)]	HFNC [mean (sd)]	Mean difference [mean (sd)]	95% confidence interval	P-value
End-expiratory lung impedance (units)	419 (212.5)	1936 (212.9)	1517 (46.6)	1425, 1608	<0.001
Mean airway pressure (cm H <sub>2</sub> O)	-0.3 (0.9)	2.7 (1.2)	3.0 (1.3)	2.4, 3.7	<0.001
Respiratory rate (bpm)	20.9 (4.4)	17.5 (4.6)	-3.4 (2.8)	-2.0, -4.7	<0.001
Borg score					
0-10	2.7 (2.6)	1.9 (2.3)	-0.8 (1.2)	-0.1, -1.4	0.023
Tidal variation (units)	1512 (195.0)	1671 (195.1)	159 (21.6)	117, 201	<0.001
Pa <sub>O<sub>2</sub></sub> /F <sub>I</sub> O <sub>2</sub> ratio (mm Hg)	160 (53.7)	190.6 (57.9)	30.6 (25.9)	17.9, 43.3	<0.001



**Fig 2** Oropharyngeal airway pressure tracing on HFNC and low-flow oxygen over 1 min. For this participant, mean airway pressure on HFNC was 4.4 cm H<sub>2</sub>O and on low-flow oxygen was 0 cm H<sub>2</sub>O.

# Comparative evaluation of high-flow nasal cannula and conventional oxygen therapy in paediatric cardiac surgical patients: a randomized controlled trial

89  
kardiyak  
hasta  
4 kg <  
8L/dk  
4kg > 20L/d  
k



# TEDAVI SÜRECİ



Oksijenasyona katkı  
Havayolu direncini  
azaltması  
PEEP etkisi  
Hasta konforu  
Nazal travma az  
NO verebilme imkanı  
**MALİYET?**



# MULTİDİSİPLİNER YAKLAŞIM

**Kardiyolog**

TEE, TTE

**Pediyatrik  
KVC**

Optimal cerrahi  
tamir, Hemostaz

**Anesteziyolog**

Erken Extübasyon  
Balans anestezi

**YOĞUN BAKIMDA  
KALIŞ SÜRESİ**

**Perfüzyonist**

Sıvı fazlalığını  
önleyecek manevralar

**Hemşire(ICU)**

Vital bulguların  
yakın takibi

**İntensivist**

Hemodinami ve solunum  
fonksiyonlarının takibi,  
sedasyon, Analjezi

**Fizyoterapist**

Aspirasyon,  
solunum terapisi









TEŞEKKÜR EDERİM