

**OUTCOME OF POSTOPERATIVE INTENSIVE
CARE UNIT AFTER PEDIATRIC CARDIAC
SURGERY IN CAIRO UNIVERSITY PEDIATRIC
HOSPITAL**

Submitted for fulfillment of the Masters degree in Pediatric medicine

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا
إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

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Abstract

Objective: To measure the in-hospital mortality and complications after cardiac surgery at the postoperative pediatric cardiac surgical Intensive Care Unit, (Abo El Reesh pediatric hospital), Cairo university.

Methodology: Our study included a total of **952** patients admitted to the Cardiac Intensive Care Unit (CICU), Children's Hospital, Cairo University during the 3 years period between April 2011 to April 2014. Retrospective observational analysis of the data of the patient's records was done.

Results: from a total of 952 patients; males (53.9%), females (46.1%). Age of patients in current study ranges from 4 days to 13 years, including neonates 39 (4.1%), infants 696 (73.1%) and children 217 (22.8%). procedures were either closed (39.6%) or open (59.1%). The incidence of morbidity was (57.6%), mortality was (30%), and (26.6%) were sent immediately back home after the operation. The most common procedure in our study is PAB followed by VSD Closure, BT shunt then Total repair of TOF and the least done procedure is (HLHS repair) procedure.

Conclusion: Mortality was encountered in 286 patients (30%). Morbidity was found in 548 patients (57.6%), the most common complications were infections particularly VAP followed by respiratory complications followed by cardiovascular complications. Risk factors for mortality were the high RACHS-1 level, prolonged bypass time, prolonged ICU stay, younger age group. The

commonest procedure in our study was PAB followed by VSD closure, followed by BT shunt then total repair of Fallot tetralogy (TOF) then PDA closure. In the current study HLHS repair (only one case performed) had the worst outcome with 100% mortality followed by arterial switch operation with 64% mortality followed by CAVC repair with mortality 48%, DORV repair and ASD closure had zero mortality.

Keywords:

- 1. Pediatric cardiothoracic surgery**
- 2. ICU**
- 3. RACHS-1**
- 4. Mortality rate**
- 5. Morbidity.**

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List of Abbreviations

aO2 gradient:	alveolar-arterial oxygen gradient
ABC score:	Aristotle Basic Complexity Score
ACC score:	Aristotle Comprehensive Complexity Score
ACTH:	Adrenocorticotrophic hormone
AKI:	Acute kidney injury
ARF:	Acute renal failure
ASD:	Atrial septal defect
AUC:	Area Under the Curve
AVM:	Arteriovenous malformation
AV :	Atrio-ventricular
Ca2:	Calcium
BT shunt:	Blalock-Taussig shunt
cAMP:	Cyclic adenosine monophosphate
CDC. :	Centers for Disease Control and Prevention
cGMP:	Cyclic guanosine monophosphate
CHD:	Congenital heart disease
CHDs:	Congenital heart diseases
CICU:	Cardiac intensive care unit
Co.A:	Coarctation of the aorta
CO:	Cardiac output
CoA:	Coarctation of aorta
CPB:	Cardiopulmonary bypass
DIC:	Disseminative intravascular coagulopathy
DO2:	Delivered oxygen
DAI:	Device associated infection
EAT:	Ectopic atrial tachycardia
EACTS:	European Association for Cardio-Thoracic Surgery

ECG:	Electrocardiogram
ECMO:	Extracorporeal membrane oxygenation
ET-1:	Endothelin-1
HAIs	Healthcare-associated infections
HFNC:	High-flow nasal cannula
HLHS:	Hypoplastic left heart syndrome
ICD-CM:	International classification of diseases-clinical modification
IL:	Interleukin
ICU:	Intensive care unit
iNO:	Inhaled nitric oxide
IO arrest :	Intraoperative arrest
JET:	Junctional ectopic tachycardia
LCOS:	Low cardiac output syndrome
LOS :	Length of hospital stay
LV:	Left ventricle
MOSF:	Multiple organ system failure
MRI:	Magnetic resonance image
NIV:	Noninvasive ventilation
NO:	Nitric oxide
OPSI:	Overwhelming postsplenectomy infection
OR:	Operating Room
PAB:	Pulmonary artery banding
PAH:	Pulmonary artery hypertension
PCICU:	Pediatric cardiology intensive care unit
PDA:	Patent ductus arteriosus
PDE5:	Type V cGMP-specific phosphodiesterase;
PGE:	Prostaglandin
PGI2:	Prostacyclin

PICU:	Pediatric intensive care unit
PRISM:	Pediatric Risk of Mortality Score
PVC:	Polyvinylchloride
PVR:	Pulmonary vascular resistance
Qp:	Pulmonary perfusion
Qs:	Systemic perfusion
RA:	Right atrium
RACHS-1:	Risk adjustment of congenital heart surgery-1
ROC curve:	Receiver Operating Characteristic curve
RV:	Right ventricle
SRS:	Systemic Inflammatory Response
SMC:	Smooth muscle cell
STS:	Society of Thoracic Surgeons
STS-EACTS:	Society of thoracic surgeons-European association of cardiothoracic surgery
STAT :	The Society of Thoracic Surgeons (STS)–European Association for Cardio-Thoracic Surgery(EACTS) mortality categories
TAPVR:	Total anomalous pulmonary venous return
TGA:	Transposition of great arteries
TNF:	Tumor necrosis factor
TOF:	Tetralogy of fallot
TPN:	Total parenteral nutrition
TxA2:	Thromboxane A2
UTI:	Urinary tract infection
VAP:	Ventilator acquired pneumonia
VO2:	Venous oxygen
VSD:	Ventricular septal defect

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INTRODUCTION

Postoperative care of pediatric cardiac patients has evolved dramatically over the past two decades, with significant improvement in survival. These improvements are attributable, at least in part to improvements in diagnostic modalities, surgical techniques, cardiopulmonary bypass (CPB) support, anesthetic management, postoperative care, and the use of extracorporeal life support to manage postoperative refractory shock (**Knowles RL et al., 2012**).

Despite an overall increase in complexity, mortality has decreased in both short-term and long-term follow-up. Several factors have contributed to this improvement in outcome, including advances in prenatal and preoperative evaluation and diagnosis, anesthetic and intraoperative management, and standardized approaches to postoperative care. For example, recent advances in the surgical and perioperative management of congenital heart disease in neonates have allowed early primary repair of cardiac lesions, such as tetralogy of Fallot with results comparable to delayed repair (**Ofori-Amanfo & Cheifetz, 2013**).

The growing implementation of multidisciplinary clinical care teams with expertise in cardiac surgery, critical care, cardiology, cardiac anesthesia, neonatology, electrophysiology, nursing, respiratory care, pharmacology, and nutritional support have had a positive impact on the care delivered to these complex patients. The development of these dedicated teams along with improved



outcomes in premature and low-birth-weight infants have changed the demographics of patients managed in pediatric cardiac ICUs (**Padley JR et al., 2011**).

Recent improvements in facilities in paediatric intensive care units (ICUs) have increased the survival rates among children suffering from congenital heart diseases (CHD), including those suffering from the more complex conditions. The patient's course after a successful heart surgery depends on such diverse factors as the severity of the CHD, age and condition of the patient before surgery, events in the operating room, and the quality of postoperative care (**Roodpeyma S. et al., 2013**).