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CLINICAL PROFILE OF POST-OPERATIVE TREATMENT DURATION IN PEDIATRIC CONGENITAL HEART DISEASE PATIENTS

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ABSTRACT

CHD (Congenital Heart Disease) is still a dangerous disease that causes a high infant mortality rate in the world. Nowadays, there are two groups of actions to treat congenital heart disease, surgical management and non-surgical management. This study discusses Clinical Profile of Post-Operative Treatment Duration in Pediatric Congenital Heart Disease Patients. Fourty medical records used for this analytical descriptive study were obtained from Department of Pediatrics and Department of Thoracic, Cardiac, and Vascular Surgeons, Dr. Soetomo General Hospital, Surabaya, Indonesia. This study described post operative treatment duration in pediatric congenital heart disease patients. The total patients in the study were 40 pediatric patients with the majority being female, namely 52.50% with higher mortality rate in patients with congenital heart disease with surgical treatment (16.6%). Most patients with CHD in children with surgical and non-surgical treatment were diagnosed in the infant age group (0-5 years), namely 31 patients (77.50%) with 5 surgical treatment patients and 26 non-surgical treatment patients. The majority of patients with congenital heart disease with surgical and non-surgical management in good nutritional status (60.00%). Most cases of cyanotic congenital heart disease are tetralogy of fallot (50%) with all of cases treated with cardiac catheterization for non-surgical treatment, zero case surgical treatment, and 5 cases without surgical or non surgical treatment. Acyanotic cases are ASD (28.56) with 4 cases cardiac catheterization, 2 cases treated with ASO device, and 1 case with ASD closure as surgical treatment. The duration of hospitalization after the procedure was shorter in good nutritional status (3.2 days) in both surgical and non-surgical treatment while shorter duration after procedure also appeared in cases of congenital heart disease with non-surgical treatment (4.25 days). CHD patients with non-surgical treatments have shorter duration compared to patients with surgical treatment. Most CHD cases were TOF for cyanotic and ASD for acyanotic with higher mortality rate in surgical treatment. Good nutritional status were found in both of the CHD treatment. Most CHD patients with surgical and non-surgical treatment were infant, female.

Keywords: CHD, Surgical, Non-Surgical, Pediatrics, Treatment Duration

INTRODUCTION

Congenital heart disease is still a dangerous disease that causes high infant mortality rates in the world with an incidence of 9 out of 1000 births (Liu et al., 2019). In Indonesia , the incidence of congenital heart disease is 8 out of 1000 live births. However, with the discovery of more sophisticated medhods. It is able to reduce the mortality rate so that currently many children with congenital heart disease are growing up at their best. There are several congenital heart diseases in Indonesia where the mortality rate is still high, for example in transposition of the great arteries with a mortality rate of 30% compared to Escord Heart Institute and Research Center, India where the mortality rate is only 8%. In 2012 to 2014, the incidence cases of congenital heart disease often occured in children age 2 to 5 years (Wulandari Et al., 2018).

In America, the most common congenital heart disease is atrial septal defect and ventricular septal defect. While research by Hariyanto (2012) stated that the most cases of CHD in RSUD Dr.M.Djamil Padang were atrial septal defects and ventricular septal defects with 35% each, Atrial septal defects (17%), ventricular septal defects (30%), persistent ductus arteriosus (16%), and tetralogy of fallot (7%) were frequently found in children in a study conducted at RSUD Sardjito in 2014. At Dr. . Soetomo Surabaya tetralogy of fallot (68.2%) was the most cyanotic CHD in 2016.

According to Djer and Madiyono (2016), the management of congenital heart disease is divided into 2, namely surgical and non-surgical. Surgical treatment is still the main solution for any congenital heart disease. Surgical methods for congenital heart disease include pulmonary artery banding, Blalock-Taussig shunt, Norwood surgery, Glenn surgery, and Fontan surgery. Advances in science and technology create non-surgical interventions. Non-surgical interventions have been carried out in Indonesia starting from 1989 through balloon atrial septostomy. Non-surgical intervention is an option for premature infants, underweight infants, and infants with severe cyanosis and is used to prepare patients for corrective surgery such as atrial valve septostomy balloons for better mixing of blood in transposition of the great arteries. Non-surgical methods include atrial valve septostomy balloon, mitral balloon valvulostomy, stenting in tetralogy of Fallot (Wenger et al., 2010).

Both types of treatment have their own advantages and disadvantages. The advantage of non-surgical treatment lies in the cost of supporting examinations, hospital room costs, and lower medical costs than surgery due to surgical treatment and short length of treatment. However, the cost of pharmaceuticals and medical devices is quite high because they are still purchased imported (Satriani et al., 2016). On the other hand, surgical treatment is not much different for a high success rate and mortality is decreasing over the years, but postoperative complications are still considered high compared to non-surgical. In fact, in the corrective management of congenital heart disease, patients may experience post-treatment complications and symptoms. In addition, the relatively high cost is one of the obstacles that can not be done surgery. Decreased heart function will also occur if there are

imperfections during treatment such as mitral stenosis, hypertrophy, and decreased mitral or tricuspid valve work. Risk factors for developing arrhythmias will also increase with age, approximately 40% will have arrhythmias by the age of 50 years. In addition, complications often occur, such as reduced muscle strength, impaired growth, and unable to eat normally (Wenger et al., 2010).

Based on the description above, it is necessary to conduct research on surgical and non-surgical management of congenital heart disease in children to describe and analyze the picture of patients with congenital heart disease who underwent surgical and non-surgical intervention at RSUD Dr. Soetomo in the specified period. How is the surgical and non-surgical management of congenital heart disease in children at Dr. Hospital. Soetomo?

LITERATURE REVIEW

Definition of Congenital Heart Disease

One of the most common disorders in children is congenital heart disease. Congenital heart disease is a cardiovascular disorder in the heart of a child from birth. There are three types of congenital heart disease, including valvular disorders such as tricuspid atresia, pulmonary atresia, and aortic valve stenosis. In addition, there are abnormalities in the walls of the heart such as ventricular septal defects, atrial septal defects, and tetralogy of Fallot. Finally, vascular abnormalities can lead to persistent ductus arteriosus, transposition of the great arteries, truncus arteriosus, and coarctation of the aorta. (Neidenbach et al., 2018) According to Djer and Madiyono (2016) in the heading Management of Congenital Heart Disease, it is stated that congenital heart disease is a heart disorder that has been present since birth with variations from showing symptoms to those that are not visible or asymptomatic. Congenital heart disease can reduce the function of the heart if left for a long time.

Management of Congenital Heart Disease

In determining the right management to treat congenital heart disease, an accurate diagnosis is needed. Including seeing in detail the history, physical examination, and supporting examinations. Advances and developments in technology have many benefits in the medical field, including in early detection of congenital heart disease. Not only that, now there are various methods of handling that are accompanied by tools with a high level of safety and accuracy. Until now, growing research has led to higher life expectancy for people with congenital heart disease. According to Rachmawati et al (2016), about 90% to 95% of children with congenital heart disease can live to adulthood. This figure is proof that the research that continues to be carried out produces positive results. Broadly speaking, the treatment of congenital heart disease in children is divided into two, surgical and non-surgical.

Congenital heart disease is a structural malformation of the heart that has been present since birth. Congenital heart disease affects how the heart works and affects the flow of blood returning to the heart until it is excreted throughout the body. Congenital heart disease can vary from a hole

in the septum to malformations and loss of one or more heart structures. (CDC, 2020) Congenital heart disease is divided into two, cyanotic and non-cyanotic. Cyanotic and non-cyanotic are divided into two types, increased blood flow to the lungs and reduced blood flow to the lungs. Cyanotic congenital heart disease is caused by central cyanosis with oxygen saturation less than 95%, causing the body to turn bluish-purple. Tetralogy of Fallot, transposition of the great arteries, tricuspid atresia, pulmonary atresia, Ebstein anomaly, truncus arteriosus, and total anomaly of pulmonary venous drainage are included in cyanotic congenital heart disease.

While non-cyanotic congenital heart disease does not cause the body to turn blue, such as atrial septal defects, ventricular septal defects, atrioventricular septal defects, persistent ductus arteriosus, pulmonary valve stenosis, aortic valve stenosis, and coarctation of the aorta. (Djer & Madiyono, 2016) From the division of congenital heart disease above, it is divided into two, surgical management and non-surgical management. Surgical procedures are carried out at the earliest possible age so that later adults do not experience heart distortion, arrhythmias, heart failure, and growth disorders that attack nerves. Surgical procedures to date, pulmonary artery banding, classic Blalock-Taussig Shunt (Classic BT-Shunt), modified Blalock-Taussig Shunt (Modified BT-Shunt), Norwood surgery, Glenn surgery, Fontan surgery, and duct replacement surgery separate lungs and heart on d-TGA. As a matter of fact, children with congenital heart disease should undergo surgery as early as possible, but in carrying out surgical procedures, the patient's body readiness is considered, such as low body weight and premature birth which can be obstacles in performing early surgery. Advances in technology and science in the medical field have resulted in several new methods, interventional cardiology. Cardiology intervention is a non-surgical treatment that is used to improve systemic and pulmonary blood flow with low rates of mortality, morbidity, and complications so that the patient's body gets better and can perform normal activities temporarily until corrective action is taken (Djer & Madiyono, 2016).

Such as the Amplatzer Septal Occluder (ASO), Amplatzer Duct Occluder (ADO), balloon atrial septostomy, balloon mitral septostomy, balloon pulmonary valvuloplasty, balloon aortic valvuloplasty, and right ventricular outflow tract stent. This study will focus on the management of congenital heart disease in children. Therefore, the researcher wanted to analyze the special characteristics of surgical and non-surgical management of children in Dr. RSUD. Soetomo. These characteristics consist of age, gender, weight, nutritional status, diagnosis, treatment time, treatment time, economic level, end result of therapy, and recurrence experienced by patients with congenital heart disease in children.

METHOD

Study design

This research is descriptive with a retrospective design.

Search strategy

The sampling technique in this study was carried out with a non-

probability sampling technique, namely total sampling.

Inclusion and exclusion criteria

Patients with a diagnosis of congenital heart disease aged less than 18 years and under were treated at KSM Pediatrics, Division of Pediatric Heart Disease and KSM Thoracic, Cardiac and Vascular Surgery at RSUD Dr. Soetomo Surabaya in the period January 2019 – December 2019.

The exclusion criteria of this study are:

• Patients with incomplete medical record data

• Congenital heart disease patients with drug action

Data extraction

This research begins with the submission of a letter of ethics and licensing to the Ethics Committee of RSUD Dr. Soetomo to be able to obtain data on patients with congenital heart disease. The data used are data from patients with congenital heart disease who are registered at RSUD Dr. Soetomo during the period January 2019 – December 2019. The data taken included research variables such as age, patient gender, patient nutritional status, patient diagnosis, patient therapy time, therapy results, and management of heart disease.

Data synthesis

Data analysis was carried out descriptively to determine age, patient gender, patient weight, patient height, patient nutritional status, patient diagnosis, patient handling time, patient therapy time, therapeutic results, and management of congenital heart disease in children at Dr. Hospital. Soetomo during the period January 2019 – December 2019. The results of the distribution of data that have been grouped based on research variables will be presented in tabular form.

RESULTS

Study selection

This research data collection was carried out in November 2021 - February 2022 using secondary data in the form of medical records from patients from the Department of Child Health Sciences who were diagnosed with cyanotic and acyanotic congenital heart disease in the period January 2019 - December 2019 at the Medical Record Installation Unit and Department / SMF Child Health Sciences RSUD Dr. Soetomo, Surabaya. During that period, there were 1353 patients with cyanotic and acyanotic congenital heart disease, but only 174 medical records were found by medical records officers. Of the 174 medical records obtained, there were 136 medical records that were incomplete or were given medical therapy so they were excluded. Thus, the medical records that became the sample of this study were 40 medical records. Medical record data used in this study were age, gender, nutritional status, congenital heart disease diagnosis, surgical or non-surgical treatment given to patients, duration of treatment, and therapeutic outcomes.

Table 1. Gender Distribution of Patients Management of Congenital Heart Disease in Children

Gender	Sum (n)	Perscentage (%)
Male	19	47,50
Female	21	52,50
Total	40	100,00

Table 1 shows that more children with congenital heart disease in the Department/SMF of Pediatrics are female. From a total sample of 40 patients, 19 patients (47.50%) were male, while 21 patients (52.50%) were female.

Table 2. Table of Relationships between Cyanotic and Asianotic Congenital Heart Disease Patients in Children by Gender with Treatment Outcomes

CHD	Surgery				Non-Surgery				Total (n)	Percentage (%)
	Death		Life		Death		Life			
	Male	Female	Male	Female	Male	Female	Male	Female		
Cyanotic	0	0	1	1	0	2	4	4	12	30
Acyanotic	0	1	1	2	2	1	11	10	28	70
Total	0	1	2	3	2	3	15	14	40	100
Percentage	0	2,5	5	7,5	5	7,5	37,5	35	100	

Table 2 shows that 1 patient died after surgical treatment (16.6%) who were female and had acyanotic CHD, while 5 patients lived after surgery (83.4%), 3 female patients with 1 patient Cyanotic CHD and 2 cyanotic CHD patients and 2 male patients with 1 cyanotic and acyanotic CHD each.

Patients died after non-surgical treatment as many as 5 patients (14.7%) with 3 female patients with 2 cyanotic CHD patients and 1 acyanotic CHD patient and 2 male patients with acyanotic CHD. There were 29 patients (85.3%) alive after surgery, 14 female patients with 4 cyanotic CHD patients and 10 cyanotic CHD patients and 15 male patients with 4 cyanotic CHD patients and 11 cyanotic CHD patients.

Table 3. Age Distribution of Children with Congenital Heart Disease with Surgical and Non-surgical Management

Age (year)	Surgery	Non-Surgery	Sum (n)	Percentage (%)
Infant (0-5)	5	26	31	77,5
Children (6-11)	1	6	7	17,5
Adolescent(12-18)	0	2	2	5
Total	6	34	40	100
Persentase	15	85	100	

Based on table 3 above, CHD patients in children with surgical and non-surgical treatment were most diagnosed in the infant age group (0-5 years), namely 31 patients (77.50%) with 5 surgical treatment patients and 26 non-surgical treatment patients. surgery. Meanwhile, in the age group of children (6-11 years) and adolescents (12-18 years), there were 7 patients (17.50%) and 2 patients (5.00%).

Table 4. Distribution of nutritional status of children aged 0-18 years with congenital heart disease with surgical and non-surgical management

Nutritional Status	Surgery	Non-Surgery	Sum (n)	Los Mean (d)
Severe	1	8	9	7,3
Moderate	1	2	3	8
Normal	4	20	24	3,2
Overweight Risk	0	1	1	1
Overweight	0	1	1	1
Obesity	0	2	2	1
Total	6	34	40	3,6

*** Los Mean = Lenght of Stay Mean (Days)**

Based on the results of the study in table 5.5 describing the entire sample of this study (40 patients), it was found that the majority of patients with congenital heart disease with surgical and non-surgical management in the Department / SMF of Pediatrics Hospital Dr. Soetomo Surabaya in the period January 2019 – December 2019 had a good nutritional status of 24 patients (60.00%). Furthermore, there were 9 patients (22.50%) with poor nutritional status, 3 patients (7.50%) with poor nutritional status, and 2 patients (5.00%) with obesity nutritional status. In this study, only 1 patient (2.50%) was found to be at risk of overnutrition and 1 patient (2.50%) was overweight.

Table 7. Distribution of surgical and nonsurgical management of congenital heart disease in children

Diagnosis	Surgery	Sum (n)	Non-Surgery	Sum (n)	Drugs treatment
Pulmonal Atresia	BT-Shunt	1	0	0	1
Tricuspid Atresia	Ligasi DAP	1	Stenting DAP	1	0
Patent Ductus Arteriosus	BT-Shunt	1	Stenting DAP	4	24
			Kateterisasi Jantung	2	0
			PTBV	1	0

Atrium Septal defect	ASD Closure	1	Kateterisasi Jantung	4	46
			Balonisasi ASO	2	0
			Stenting DAP	1	0
Ventricle Septal Defect	VSD Closure	1	Kateterisasi Jantung	6	25
	BT-Shunt	1			0
Coarctatio Aorta	-	0	Kateterisasi Jantung	2	1
Single Ventricle	-	0	Kateterisasi Jantung	1	0
Pulmonary Artery Stenosis	-	0	PTBV	2	0
Tetralogi of Fallot	-	0	Kateterisasi Jantung	6	6
Transposition of Great Arteries	-	0	Kateterisasi Jantung	1	5
			Balloon Atrial Septostomy	1	0
Pulmonary Regurgitation	-	0	-	0	3
Tricuspid Regurgitation	-	0	-	0	5
Hydrocephalus	-	0	-	0	1
Cyanotic Attack	-	0	-	0	1
Rheumatic Heart Disease	-	0	-	0	2
Heart Failure	-	0	-	0	1
CAD	-	0	-	0	1
Congenital heart block	-	0	-	0	1
Dilatative Cardio Myopathy	-	0	-	0	1
TAPVR	-	0	-	0	1
atherosclerosis	-	0	-	0	1
Dextrocordia	-	0	-	0	1
Dekompensasi kordis	-	0	-	0	1
PFO	-	0	-	0	4
Cord Decompensation	-	0	-	0	2
Total		**6**		**34**	**134**

In table 7 which describe the entire sample of this study (40 patients plus 134 patients with drugs), it can be seen the distribution of the types of CHD in patients in the Department / SMF of Pediatrics Hospital Dr. Soetomo Surabaya in the period January 2019 – December 2019. The most common type of cyanotic CHD was Tetrology of Fallot with 12 patients (6.90%). In the second, there was

Transposition of the Great Artery in 2 patients (4.02%). The most common type of non-cyanotic CHD was atrial septal defect as many as 54 patients (31.03%) while, there were ventricular septal defects with 33 patients (18.97%).

Table 8. Overview of the length of treatment with surgical and non-surgical management of congenital heart disease in children

Treatment Duration	Treatment	
	Surgery	Non-Surgery
CHD	5.5	4.25

The average length of stay was found to be longer in patients undergoing surgical treatment (5.5 days) than patients undergoing non-surgical treatment (4.25 days).

Table 9. Distribution of therapeutic results with surgical and non-surgical management of congenital heart disease in children

Therapy Result	Surgery	Non-Surgery
Death	1	5
live	5	29

Patients who died were found to be more in cases with surgical management of 5 patients (16.6%).

DISCUSSION

Gender Relationship of Congenital Heart Disease Patients in Children with Surgical and Non-surgical Management

Based on this study, the characteristics of patients with congenital heart disease in children with surgical and non-surgical management at the Department / SMF of Pediatrics at Dr. Hospital. Soetomo Surabaya in the period January 2019 – December 2019 based on gender found more female (52.50%) than male (47.50%), 6 patients (15%, 2 male and 4 female) CHD with surgical management and 34 patients (85%, 17 male and 17 female) had CHD with non-surgical management. In surgical treatment there were 1 patient (16.7%) female with the final outcome died and 5 patients (83.3%) had a survival outcome, while in non-surgical treatment there were 5 patients (14.7%, 2 males and 3 female) died and 29 patients (85.3%) lived.

This is in accordance with research conducted by Caudle in 2017 [7] that of the 57,293 patients who underwent surgical management of congenital heart disease from 1997 to 2015 there were 56.7% female and 43.3% male. In addition, a study by Idrizi., et al in 2015 [8] on interventional care for patients with pulmonary valve stenosis from 43 patients who underwent percutaneous balloon catheter valvuloplation management of which 28 patients (65%) were female and 15 patients (35%) were male. However, a study

conducted at Sanglah Hospital, Bali [9] had different results in that more male patients (3.60%) underwent atrial balloon septostomy than females (2.4%). In previous studies of CHD patients with surgical and non-surgical management, there was no significant difference between treatment and patient gender.

A study at RSCM comparing surgery and transcatheter with ASO stated that 10 out of 17 patients with non-surgical treatment, namely transcatheters with ASO, were female. This is done because non-surgical or minimally invasive methods provide better cosmetic results than conventional or surgical methods and reduce breast and pectoral muscle development disorders, so they are often performed on women. However, the choice of treatment also depends on the severity of the disease or the size of the defect. This study suggests that DSA with large defects is more likely to require surgery [10].

4.2 Age Distribution of Patients with Congenital Heart Disease in Children with Surgical and Non-surgical Management

Not only screening tools have been developed so that they can detect CHD as early as possible, but the management of CHD also continues to develop so that CHD patients do not have to wait long to improve their quality of life. Research data illustrates that the most age for CHD patients undergoing surgical or non-surgical treatment occurs in infants (0-5 years, 77.5%). The mean age for surgical treatment was lower than for non-surgical treatment, but there was no significant difference in the age of CHD patients with surgical and non-surgical treatment. A study by Satriani [6] explained that the mean age of patients treated with DSA surgery was 7.7 years, while the average age for patients treated with non-surgical DSA was 6.6 years. In addition, research by Helmy et al., 2013 [10] showed the mean age of patients treated with DSV surgery was 6 years while the average age of patients treated non-surgical DSV was 5.9 years. There is no difference in age, weight, and height. Therefore, age and weight are not determinants in the choice of procedure, but are requirements for the implementation of both surgical and non-surgical management. In some complex cases, if a percutaneous approach is difficult or the patient also requires temporary repair to stabilize the body's condition, non-surgical surgery can be performed first so that surgery can be performed in the future.

4.3 Relationship of Nutritional Status and Lenght of Stay of Patients with Congenital Heart Disease in Children with Surgical and Non-surgical Management

The data in this study showed that the average CHD patients with surgical and non-surgical management had good nutritional status. This is in accordance with research conducted by Lim., et al in 2019 [11] the nutritional status of children with CHD varies due to many factors that need to be seen and also the type of CHD itself. Babies with CHD generally have normal weight and length at birth because their nutritional needs come from the placenta. However, with increasing age, metabolic needs cannot be fulfilled due to CHD. Research conducted [12] on 161 patients undergoing surgical management of CHD, there were 57% of patients with good

nutritional status and 40% of patients with malnutrition consisting of 28% underweight, 22% wasting, and 16% stunting and 3% excess nutrition. The data in this study are the same as the distribution of the data in this study.

According to a study [11] the average duration of treatment for CHD patients with height Z-score was less than minus two for 8 days, while the average duration of treatment for CHD was height Z-score was more than minus 2 for 6 days. . The impact of nutritional status before surgery with the final outcome of surgery, it was found that nutritional status based on weight with age at Zscore less than 2 had a high mortality in the first 30 days, while nutritional status based on height with age Zscore less than 2 was associated with the length of duration of treatment at home. sick. The above statement when associated with this research data is appropriate, in CHD patients with surgical and non-surgical management who have poor nutritional status or poor nutritional status, the average duration of hospitalization is 7.3 days compared to CHD patients with good nutritional status, namely 3. 2 days. Research by Ismail., et al in 2021 [13] provided a statement on the impact of nutritional status on CHD patients undergoing CHD management with length of stay in the ICU. This is in accordance with the study of the duration of ICU treatment [11] for patients with CHD with height Z-score is less than minus two for 3 days, while the average duration of ICU treatment for CHD treatment is height Z-score is more than minus two for 2 days. The average length of stay was found to be longer in patients undergoing surgical treatment (5.5 days) than patients undergoing non-surgical treatment (4.25 days). .

4.4 Relationship between Diagnosis of Congenital Heart Disease in Children with Surgical and Non-surgical Management

The intervention is to reduce the possibility of complications, improve quality of life and reduce the likelihood of recurrence. However, complex CHD requires surgery as early as possible in order to grow and develop like children in general. In 2002 – 2005 according to Helmy, the main DSA closure procedure was surgery because the transcatheter procedure was not covered by government health insurance. However, the data of this study show that more and more non-surgical treatments are being given to CHD patients. This is almost the same as research in America in 2013 – 2017, in that year surgical therapy for DAP was still selective in BT-Shunt or stenting. In 2018, DAP surgical therapy became stenting in all patients requiring palliative therapy. There is no contraindication to DAP stenting surgery [14]. Research by Satriani et al., 2015 in RSCM there were 39 DSV patients underwent transcatheter and 30 DSV patients underwent surgery.

The results of the study showed that there was no significant difference between the types of CHD with surgical and non-surgical management. This can happen because there are many things that must be considered. Although pre-, internal and post-operative care has advanced in providing low mortality, it is necessary to look at the financial aspects of both surgical and non-surgical treatments.

Research conducted that the pharmaceutical cost of surgical procedures (Rp. 27,638,311) is

greater than transcatheter procedures (Rp. 17,077,864) [6]. Several studies have shown that the cost of surgery is greater than the installation of ASO, this occurs because postoperatively the patient requires a longer treatment in the hospital and the need for more pharmaceuticals to improve the final outcome of the operation. However, the installation of ASO also has a total expensive procedure due to the cost of procuring ASO equipment. This is also said by the researchers cannot be generalized because the health management system is different for each hospital. So that the choice of treatment for CHD patients is more about the interpretation of the supporting examinations and the total cost factor that must be incurred by the patient's family rather than the type of congenital heart disease itself such as the size of the DSA defect that is performed surgery is 10 millimeters but the size of the DSA defect with a transcatheter is 3, 4 millimeters.

CONCLUSION

The most common treatment for children with CHD is heart catheterization for ASD patients. The lenght of stay were shorter in CHD patient with non-surgery treatment (4.25 days) compared with surgical treatment (5.5 days). Most CHD cases were TOF for cyanotic and ASD for acyanotic with higher mortality rate in surgical treatment. Good nutritional status were found in both of the CHD treatment. Most CHD patients with surgical and non-surgical treatment were infant and female.

Consideration should be given to the guideline recommendations suggesting switching to non-surgery treatment when the severity and defect is not. Research analytical methods to identify and analyze the most suitable treatment for patients with CHD may be needed.

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