Effects of Application of a Nurse Driven Clinical Pathway Guidelines on Selected Health Outcomes in Children with Congestive Heart Failure

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Abstract

Pediatric heart failure (HF) is a complicated clinical illness that has several causes as well as common disease development pathways. The developing evidence clinical pathway will most certainly enhance the outcomes of children with HF in the future. **Purpose:** effects of application of a nurse driven clinical pathway guidelines on selected health outcomes in children with congestive heart failure. **Design:** Quasi-experimental research design. **Setting:** pediatric intensive care unit (PICU) at Menoufia University Hospital, Shebine Elkom city, Menoufia Governorate. **Subjects:** a purposive sample of sixty children with congestive heart failure who divided into study & control groups and a convenient sample of 50 care providers including nursing staff, pediatricians, pharmacist, dietitian and physiotherapist. **Tools:** four tools were used; **I:** congestive heart failure children's assessment, **II:** congestive heart failure complications, **III:** modified clinical pathway guidelines variances checklists and **IV:** Nurse driven clinical pathway guidelines competency evaluation tool. **Results:** there was statistical significant difference between study and control groups as regards hemodynamic state, chest sound, edema, dyspnea, chest pain, systemic complications, length of stay in PICU, and variance deviations. In addition, there was statistical significant difference between competency score at pre and post clinical pathway guidelines sessions among multidisciplinary team. **Conclusion:** Children with congestive heart failure in study group reported a more hemodynamic stability, lower mean scores of chest pain, episodes of dyspnea and edema. Also, it contributed to no systemic complications in the majority of these children with higher positive variation than children in control group. **Recommendations:** replication of the study on large probability sampling.

Keywords: Congestive heart Failure, a nurse driven clinical pathway guidelines, and children's health Outcomes.

Introduction

Pediatric heart failure represents (PHF) a significant contributor to morbidity and mortality in childhood. It is a potentially fatal condition that needs to be treated in an emergency care facility. There are now defined standards for the management of heart failure in the adult patients, but there is a lack of a similar consensus in the pediatric population. For the best possible outcome in a clinical environment, establishing the etiology and ensuring an accurate diagnosis are crucial. The International Heart and Lung Transplantation Society, in 2017 defined heart failure in children as "a clinical and pathophysiological disease that develops from ventricular dysfunction, volume or pressure overload, separately. Or a combination" **(Das, 2018).**

In addition, Jayaprasad (2016) has provided a useful definition of heart failure in children as a disease that is clinically and pathophysiological progressive due to cardiovascular and extracardiac abnormalities causing signs and Characteristic symptoms include edema, respiratory distress, growth retardation, exercise intolerance and are accompanied by circulatory, neurohumoral, and molecular disorders. Contrarily, HF in adults has been thoroughly studied, resulting to the development of evidence-based guidelines; nevertheless, it has received less attention in children as a result of a number of challenges. The causes of HF in children are very different from the causes of the condition in adults, including coronary artery disease and hypertension. Congenital heart disease (CHD) and cardiomyopathy are the most frequent

causes of cardiac failure in youngsters **(Burstein et al., 2019).**

The management of congestive heart failure (CHF) can be challenging and even hazardous without understanding the underlying reason. Therefore, developing a thorough understanding of the etiology is the top objective. (Choi et al., 2019). Clinical Pathways are interdisciplinary management plans that specify the crucial procedures and timing for management of patients who have a particular clinical issue." Clinical practice guidelines (CPGs) that are nationally recognized are often used by doctors to construct clinical pathways, and advisory committees or boards may make adjustments as needed. Clinical Practice Guidelines (CPGs) are widely used as a starting point by some healthcare professionals when creating their own Clinical Pathways, which they then modify in accordance with their own clinical experience **(Jabbour et al., 2018).**

Care pathways have gained popularity as a strategy to improve the quality of management by enhancing patient outcomes, fostering patient safety, reducing patient problems, and maximizing resource usage. Additionally, this integrated strategy's crucial goal is to reduce hospital mortality, hospital stay length, and readmission rates when compared to conventional care. Pediatric nurses play a significant part in this "heart failure team" due to their exceptional clinical evaluation and communication abilities as well as their ability to interact closely with patients **(Maddox et al., 2021).**

Professional pediatric nurses participate in clinical pathway programs and carry out significant responsibilities, particularly in long-term care programs. Additionally, skilled pediatric nurses with experience in heart diseases have a crucial role to play, such as identifying the warning signs and symptoms of cardiac deterioration, checking for therapy compliance, providing counselling and psycho-social support, developing behavior modification techniques, and connecting patients and their families to healthcare throughout the course of the disease **(Harley et al., 2019).**

Although numerous systematic reviews and meta-analyses have assessed the impact of multidisciplinary teams on the symptoms of heart failure in adult patients, no research has been done on the impact of nurse-driven clinical pathway programs on children's heart failure health outcomes variables. In order to ascertain the impact of a nurse-driven clinical pathway on the health outcomes in children with congestive heart failure, this study was carried out.

Significant of study

Pediatric heart failure (HF) has a numerous varied clinical and etiological manifestations. HF in pediatrics represents a serious purpose of morbidity and death in childhood **(Muthumala, 2017)**. The actual global incidence and prevalence of heart failure (HF) in children is difficult to determine due to lack of standard definition used for heart failure. The phenotype of HF also differs in congenital heart disease (CHD) and cardiomyopathies. The reported incidence of HF in children is 0.97 to 7.4 per 100,000. In the US, 11,000–14,000 child are hospitalized for heart failure every year. Most children with HF are born with CHD, and depending on age, between 25 and 75 percent of paediatric HF patients have underlying CHD **(Saleh et al., 2020).**

In Egypt, there are little regional-level statistics on pediatric heart failure (HF) patients. Additionally, there is a lack of information regarding the incidence of mortality, and morbidity of pediatric heart failure hospitalizations **(Muhammad & Abubakar, 2021)**. Furthermore, there has been little research done and training programs offered in Egypt for pediatric patients addressing the management of HF, despite the fact that a lot of research on the treatment of HF in adults has been published. For this reason, this study was conducted to determine the effect a nurse driven clinical pathway guidelines on the selected health outcomes in children with congestive heart failure.

2. Methods

2.1. Purpose of the present study:

To determine the effect of application of a nurse driven clinical pathway guidelines on

selected health outcomes in children with congestive heart failure.

Objectives:

1. To develop an clinical pathway guidelines to care child with congestive heart failure based on the best evidence-based practice, a clinical review of experience, medical notes, and the specialist knowledge of a clinical team.
2. To create a multidisciplinary team who provide standardized care for children with congestive heart failure to ensure their commitment to care and empowering joint decision-making.
3. To enhance outcomes for children with congestive heart failure, define clinical practice, and reduce care variability.

2.2. Operational Definitions:

- **A nurse driven clinical pathway guidelines**: in this study, expert pediatric nurses participate in clinical pathways to provide groups of patients with timely established clinical practices developed from clinical health care pathways guidelines in light of the unit routine care provided to such patient group taking into account individual patient differences and patient conditions.
- **Selected Children's health outcomes**: it is a hemodynamic state as determined by oxygenation, breathing less than 30 c/m, lung sounds, pulse rate, arrhythmias, temperature, and blood pressure, episodes of dyspnea, chest discomfort, and peripheral edema, the state of each body system's health, the number of positive and negative variations, and the length of stay in the PICU (per days).

2.3. Research hypotheses*:*

1. Children with congestive heart failure who exposed to a nurse driven clinical pathway guidelines application demonstrate more hemodynamic stability than those who receive routine hospital care.
2. Children with congestive heart failure who exposed to a nurse driven clinical pathway guidelines application demonstrate lower mean scores of chest pain, episodes of dyspnea and edema than those who receive routine hospital care.
3. Children with congestive heart failure who exposed to a nurse driven clinical pathway guidelines application demonstrate no systemic complications than those who receive routine hospital care.
4. Children with congestive heart failure who exposed to a nurse driven clinical pathway guidelines application have higher number of positive variation than those who receive routine hospital.

2.4. Research design

Quasi-Experimental design (study and control groups) has been utilizes to accomplish the aim of this study.

2.5. Setting

This research was carried out at the pediatric intensive care unit (PICU) in Menoufia University Hospital, Shebine Elkom city, Menoufia Goverorate. This unit lies in the fourth floor. It is divided into four sections, the first section being separated into three foreground and one background ones (the second section). This unit contains two emergency cars, an x-ray machine, 10 mechanical ventilation units, 16 syringe pumps, 10 monitors, 10 mechanical ventilation units and one refrigerator.

*2**.6. Subjects***

- A purposive sample of 60 children was split into two equal groups that were control and study (30 children each) . The patients were divided into study and control groups using a simple random sample based on the equation: $n = \bar{p}(1 - \bar{p}) \times (z1-\_/2 + z1-\_)\ 2 \div (p1 - p2)2$ with a confidence level of 0.95 and test power 80%. Where n is the sample size, $\bar{p} = (p1 + p2) \div 2$, p1 = 0.50, p2 = 0.34.
- A convenience sample of 50 care providers who were the clinical pathway team including nursing staff (33), pediatricians (7), pharmacist (3), dietitian (5) and physiotherapist (2).

2.7. Inclusion criteria

Children were included in the study according to the following criteria:

- Diagnosed with congestive heart failure.

- Aged from 1 to 15 years.

2.8. Exclusion criteria

Children who were unconsciousness, on mechanical ventilation, had malignancy and other chronic diseases as diabetes mellitus and hypertension.

2.4 Instruments

Three instruments were used to collect data in order to fulfil the aim of the study.

Instrument I: Congestive heart failure children's assessment. It was created by the researcher using the relevant literature (Mohamed et al., 2018) to assess the critically ill patients with congestive heart failure. It is divided into three parts:

Part one: Characteristics of studied children: it included children's age, sex, and diagnosis.

Part two: Cardiovascular assessment: It contained three assessments about:

- **Hemodynamic status**. Assessment finding for pulse rate, temperature, respiration, and mean arterial blood pressure.
- **Pitting edema scale**. It adopted from Anderson et al., (2019) to assess severity of pitting edema, that ranged from slight edema (+1) to severe edema (+4) with 8 mm depth of indentation and return to baseline after 2-5 min.
- **Pain assessment scale.** Two pain assessment scales were used in accordance with the children's age.

- **Wong-Baker Faces pain Scale** for (1-7) age. It was adopted from Lawson et al., (2021). Faces indicated pain ranged from doesn't hurt (0) to hurts as much as patient can imagine (5). Reliability of the tool was determined by Cronbach's co-efficiency alpha test. It was r =0.85.
- **Word-Graphic Rating Scale (WGRS)** for (8-18) age. It was adopted from Mahna et al., (2019). It is straight line divided into five grading words reflecting pain intensity ranged from no pain (0) to worst possible pain (8)**.** Reliability of the tool was determined by Cronbach's co-efficiency alpha test. It was r = 0.86.

Part three: Respiratory assessment.

- It included monitoring oxygen saturation (%), Arterial blood gases (ABG), and abnormal lung sounds such as crackles and wheezing.
- **Pediatric Dyspnea Scale (PDS)**. It was adopted from Eggink et al., (2016). It was a valid faces scale similar to the Wong-Baker scale designed to assess the difficulty of breathing and chest tightness with high test-retest reliability A Pearson at 0.95. Children's' responses were measured on seven faces scale, the score ranged from (one) "No trouble at all" breathing to (seven) where breathing is "Very much trouble.

Instrument II: Congestive heart failure complications. It was adopted from Mohamed et al., (2018). It contained three categories of complications, which were cardiac complications, respiratory complications and renal complications. The score of cardiac complication ranged from one to six (no complication =1, hypotension = 2, ventricular arrhythmia = 3, atrial fibrillation = 4, tachycardia = 5 and more than one complication = 2). The score for respiratory complications ranged from one to three (no complication = 1, pulmonary congestion = 2 and pulmonary edema = 3). The score for renal complications ranged from one to three (no complication = 1, acute renal failure = 2 and renal impairment = 3).

Instrument III: Clinical pathway guidelines variances checklists. An observational checklist adopted from Mohamed et al., (2018) to spot differences and estimate how far they deviate (positive or negative) from the suggested outcomes. It included three different kinds of variations. (1) patient-family variance (3items), negative patient-family variance, happens when a patient doesn't follow the advised therapy plan and needs additional interventions. While positive patient variance happens when the patient adheres to the suggested course of treatment. (2) Health care providers' variance (3items) was tied to the critical care team. Variances of this nature might be either negative as in the case of delayed medical consultation and

insufficient discharge planning or positive as accurate procedures practices. (3) Hospital variance (3items) may be positive or negative depending on how routine hospital operations are handled. For instance, it may be positive if there are enough supplies available for patient care. It may also be negative if test results are delayed, procedures are postponed or cancelled, or patients are delayed in being discharged. Scoring items for each observation ranged from one score for negative variance and two score for positive variance.

Reliability of clinical pathway guidelines variances instrument was assessed to examine the degree to which the tool's items were related to one another, by Cronbach's co-efficiency α (a=0.85). The instrument items were checked for the internal consistency by Pearson correlation (r=0.95).

Instrument VI: Nurse driven clinical pathway guidelines Competency evaluation tool. It was developed by the researchers based on literature review (Barton et al., 2020 & Unsworth et al., 2020) to ensure the comprehension and readiness of the multidisciplinary team to utilize and apply the clinical pathway for children with congestive heart failure. It included two parts:

Part I: Understanding clinical pathway guidelines. It contained four elements to evaluate the ability of the multi-disciplinary team explain the clinical pathway guidelines during admission, acute, maintenance stages, and discharge criteria.

Part II: Utilization of clinical pathway guidelines. It divided into two sections:

Section A: Comprehensive assessment of critically ill children with congestive heart failure. It contained seven elements which were ability to assess hemodynamic stability, ability to assess severity of biting edema, ability to assess pain intensity, ability to monitor O2 saturation, ability to monitor ABGs, ability to assess breathing sounds, and ability to utilize pediatric dyspnea scale.

Section B: Practical skills. It included four elements including ability to follow aseptic technique, ability to apply breathing exercise and relaxation techniques, and ability to perform accurate, safe and comfort nursing procedures (diuretics medication administration, weight monitoring intake & output monitoring), ability to perform O2 therapy, drug safety, diet recommendation, chest physiotherapy& postural drainage and documentation.

Scoring system: All items' responses ranged between (0-3) in which (0) indicated insufficient comprehension, (1) need improvement, (2) sufficient and (3) competent. The total score was 45, the multidisciplinary team was considered competent when achieving a total score of > 46.

Reliability of nurse driven clinical pathway guidelines Competency evaluation instrument was assessed to examine the degree to which the tool's items were related to one another, by Cronbach's co-efficiency α (a=0.82). The instrument items were checked for the internal consistency by Pearson correlation (r=0.94).

2.7 Validity

Three pediatric nursing professors and two professors of medical-surgical nursing made up the jury of five experts that reviewed the three instruments to ensure their validity and make any necessary modifications. The changes were made to ensure that they were thorough and pertinent.

2.8 Pilot study

The instruments were tested on 6 children (10% of the sample) before the data collection started to see if they were useful and how long they would take to complete. No necessary changes were performed. As a result, the pilot study was included in the final sample.

2.9 Ethical considerations

- The Ethical Research Committee at the Faculty of Nursing at Menofia University provided the official approval. The researcher introduces himself to each child or family participating in the study and explains its objective. Participants' informed consent was obtained, and anonymity was assured. Patients' privacy and data confidentiality were respected.

2.10 Data collection

- After sending a formal letter to the dean of the faculty of nursing at Menoufia University outlining the goals of the study and the

procedures for data collection, the directors of the chosen setting provided official approval for the study to be carried out. First, meetings were held with the directors of the settings to acquire their permission for conducting the research and to explain its purpose and anticipated results.

- Data collection for this study was conducted for a period of 8 months extending from the 1st of Jun 2019 to the end of January 2020. Data collected throughout four phases: preparatory, assessment, implementation, and evaluation phases.

Preparatory phase:

- A review of recent and past, local and global related literature in the various elements of the problems using books, articles, periodicals, and magazines was completed.
- Then, the clinical pathway guiding procedures and study materials were prepared, along with the members of the healthcare team that would be managing this group of patients.
- This phase was completed with a pilot study and an evaluation of standard hospital care provided to patients upon admission, throughout their stay, and upon discharge.
- A formal permission was obtained from the multidisciplinary team to engage in the intervention process and their agreement to the clinical pathway practice guidelines.
- **Clinical pathway team** was made up of the nursing staff, pediatricians, pharmacists, dietitians and physiotherapists.
- The established pathway protocol was assessed by specialists in the fields of services and education to check for content validity.
- The researchers designed the content of six meetings with the various PICU team members (nurses, pharmacist, dietician, physiotherapist, and cardiologist) to describe the nature and goal of the study and to improve the care pathway approaches.
- The clinical pathway guidelines were designed by multidisciplinary team (PICU team members) were aimed to ensure that adequate assessment and teaching is done to enable caregivers to manage the patient's disease process and maintain as much independence as possible and improve of patient's health outcomes through included measures and procedures to (1) improve cardiac function to ensure medication regimen, (2) decrease cardiac demands by measures to ensure functional abilities by reduce metabolic needs to decrease workload on the heart), (3) improve tissue oxygenation and decrease oxygen consumption to ensure limiting physical activities, preserving body temperature, prevent infection and reducing the effort of breathing (semi fowler's position)) and (4) remove accumulated fluid and sodium to ensure dietary compliance, fluid restriction and medication compliance.
- Clinical pathway guidelines, procedures, and checklists included the suggested pathway plan for CHF patients to be utilized as a guide for detailed care in patient's files.

Assessment phase:

- Both study and control group subjects were assessed on admission to obtain baseline data including characteristics of studied children using instrument I part one. Then, subjects were assessed through assessed hemodynamic status, edema, and pain intensity using instrument part two and observing patients and recording dyspnea using instrument part three, complications monitoring utilizing instrument II and recording positive and negative variances by using instrument III.
- The patients were assessed by the clinical pathway team and researchers throughout a three-stage period, **admission stage**, for the first 24 hours, during which patient assessments were performed every 15 minutes in the first hour, every 30 minutes in the second hour, and every 1 hour after that, **the acute care stage** which targets the next two days, during which patient assessments were performed every 4 hours and **the maintenance stage** which lasts for a further three days, involved twice-daily patient assessments (figure1).
- Pre intervention assessment was conducted for PICU team using instrument VI to assess their comprehension and readiness to apply clinical pathway guidelines. They were interviewed at PICU on every Sunday for three weeks for about 30 to 45 minutes.

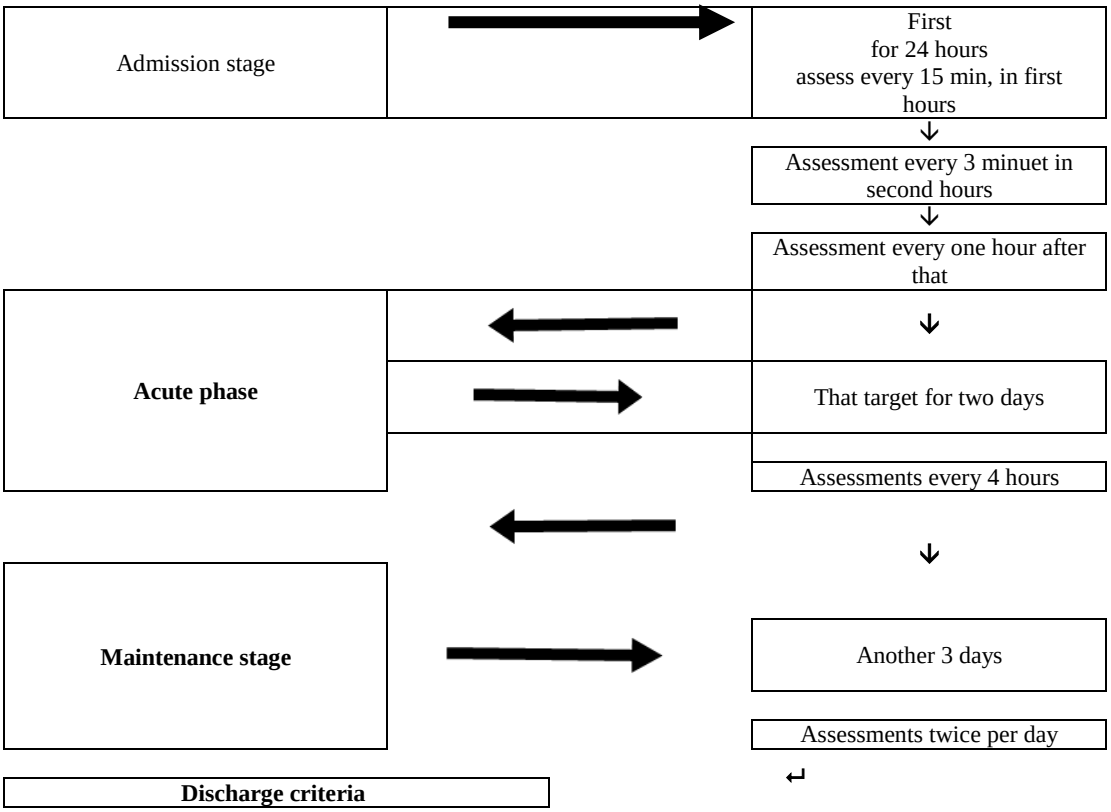

Figure 1: Daily patient's assessment

Implementation phase:

For control group subjects;

- Data collected from the control group patients first before implementation of the clinical pathway guidelines.
- The patients in the control group just received standard hospital care included measures to relieve fluid overload and anxiety and fatigue symptoms, promote physical activity, increase medication compliance, decrease adverse effects of treatment, teach patients about (dietary restrictions, self-monitoring of symptoms, daily weight monitoring).

For study group subjects;

- The researchers presented and introduced six informative discussions sessions for PICU team regarding the clinical route guidelines to ensure their comprehension and readiness to apply. Six sessions were applied for the total sample of PICU team (50 caregivers) and were conducted for six consecutive days according to patients' needs. These sessions was carried out at the PICU during break time. Each session included 8 - 9 PICU team and lasted for ٣٠ to ٤٥ minutes.
- **1st session** aimed at establishing an appropriate relationship with PICU team and orienting them about the benefits of the clinical pathway approach to care children with congestive heart failure during admission, acute, maintenance stages besides the goal and nature of the study. **2nd session and 3rd session** aimed at providing general knowledge on how to use clinical pathway guidelines through comprehensive assessment of critically ill children with congestive heart failure which included how to assess hemodynamic stability, severity of biting edema, pain intensity, O2 saturation, breathing sounds, monitor ABGs and utilize pediatric dyspnea scale. **4th session included and 5th session** aimed at helping PICU team to learn and practice about practice guidelines for promoting health outcomes in children with

congestive heart failure (follow aseptic technique, breathing exercise and relaxation techniques perform accurate, safe and comfort nursing procedures (diuretics medication administration, weight monitoring intake & output monitoring, vital signs, appropriate positioning), O2 therapy, drug safety, diet recommendation, chest physiotherapy& postural drainage and documentation. Finally, **6th session** included summary of all guidelines and discussion with PICU team to provide answers for all questions, and they discussed any unresolved difficulties and addressed any questions that were highlighted.

- The researchers served in various capacities, including participant observer, care coordinator, trainer, and implementation supporter throughout the course of the study period.

Evaluation phase:

- Patients' clinical results and outcomes in both groups were evaluated daily for six days. Then the mean of these readings was calculated.
- After the end of the six days, the researcher recorded positive and negative variances including patient variance, clinician variance and hospital variance.
- After completing six sessions, Posttest was conducted for PICU team using instrument VI to reassess their comprehension and readiness to apply clinical pathway.

4. Statistical analysis

Following the completion of data collection for the intervention group, statistical analysis was performed using the program SPSS (version 20.0). Data were presented using descriptive statistics, which are frequencies and percentages (N,%) that are used to describe and summarize qualitative variables. Utilizing means and standard deviation, quantitative variables are summed together and reported. Quantitative continuous data from two groups were compared using the t-test. Comparing qualitative variables was done using chi-square ($\chi 2$) was declared statistically significant when it was less than 0.05, which is the key value for testing (Washington et al., 2020).

Results

Table 1 demonstrated that there were roughly equal numbers of males and females in both groups (50.0%, 50.0%). The average ages of the study and control groups were also (7.26±2.88) and (7.00±3.22) respectively. In addition, the study group was diagnosed with congestive heart failure with patent ductus arteriosis in the highest percentage (26.7%), whereas the control group was diagnosed with congestive heart failure with ventricular septal defect (VSD) in the highest percentage (33.3%). Between the subjects in the two groups, there were no statistically significant differences in any of the table items.

Table 2 clarified that more than half of studied nurses (54.5%) were between 20-<25 years with mean age 25.45 ± 4.25 years. Meanwhile the majority of pediatricians (85.7%) were > 30 years with mean age 33.88± 4.48. Also all the other care providers (100%) were >30 years with mean age 37.20 ± 1.54. Regarding sex, the majority (84.8%) of studied nurses were female and nearly two thirds of pediatricians and other care providers were male (71.4% & 70.0% respectively). In relation to level of experiences, less than half of studied nurses (48.5%) had 1- <5 years. In addition, less than half (42.9 %) of studied pediatricians had experiences of 5-10 years and ≥ 10 years. Also, more than half of other care providers had experiences ≥ 10 years

Figure 2 shows that the majority of studied nurses (81.8%) were graduated from institute of nursing technician. Meanwhile nearly two-thirds (71.4%) had postgraduate degree and half (50%) of the physiotherapist had postgraduate degree and the other half of physiotherapist (50%) had bachelor degree. In addition, more than half of dietitian and pharmacist had postgraduate degree (60% & 66.70% respectively).

Table 3 showed extremely statistically significant differences in pulse and arterial blood pressure between the study and control groups from the first to the sixth day ($P \leq 0.01$), as well as statistically significant differences in respiration from the second to the sixth day. Regarding the study group patients, there was a highly statistical significant difference between the first and fourth days and the fourth and sixth days regards pulse, respiration, and mean arterial pressure ($P \leq 0.01$).

Table 4 shows that there were highly statistically significant variations between the study and control groups' Sao2 and Pao2 levels on the first, second, and fourth to sixth days. Regarding the study group patients, there was a statistically significant difference between the

first and fourth days and the fourth and sixth days regards arterial blood gas values ($P \leq 0.01$).

Table 5 demonstrated a statistically significant difference ($P<0.05$) between the study and control groups at the fourth to sixth days in regard to lung sound. There was also a very statistically significant difference ($P<0.001$) between the first and fourth days for the study group alone. Additionally, there were highly statistically significant difference between the study and control groups from the fourth to the sixth day in terms of peripheral edema. Also, the comparison between the study group alone at the first and fourth days showed a highly statistically significant difference. In relation to dyspnea, there were statistically significant difference between study and control groups at fourth to sixth days. In addition, there was highly statistical significant difference when comparison between first and fourth day and comparison between fourth day and sixth days as regards to study group patients. Thus, hypothesis two was supported.

Table 6 illustrated that there were highly statistically significant differences between both groups (study & control) from the second to sixth days concerning the severity of chest pain intensity for small age group. Additionally, there were statistically significant variations for the study group between the first & fourth and forth & sixth days. Additionally, there was a highly statistically significant difference in chest pain intensity for old age between the study and control groups from the second to the sixth days. When comparing the first & fourth and the fourth & sixth days for the study group, there were also highly statistically significant differences. Thus, hypothesis two was supported.

Table 7 displayed a statistically significant difference ($p <0.05$) in cardiac complications between the study and control groups from the fourth to sixth days. Additionally, the comparison between the study group alone at the first and fourth days for cardiac complications showed a statistically significant difference. Also, the difference between the study and control groups in terms of respiratory complications was statistically significant at days 4, 5 and 6 ($p< 0.05$& $p <0.01$). Additionally, the comparison between the study group alone during the first & fourth days and the fourth & six days showed a statistically significant difference. Regarding renal complication, there were statistically significant differences between the study and control groups at fifth and six days ($p< 0.05$). Also, the comparison between the study group alone during the first & fourth days showed a statistically significant difference. Thus, hypothesis three was supported.

Figure 3 showed that more than three quarters (80.0%) of the children in the control group stayed longer than or equivalent to seven days, in contrast to the majority (83.7%) of study group children who stayed between five and six days. Therefore, there were a statistically significant difference between the two groups ($p<0.01$).

Figure 4 showed that the majority of children (80%) had positive variance on study group compared to control group children (20%) had negative patient variance. Also, regarding to clinician variance, the highest percentage of children (76.7%) had positive variance on study group compared to control group children (23.3%) had negative variance. Moreover, regard hospital variance, the two third of children (70 %) had positive variance on study group compared to control group children (30%) had negative variance. Thus, hypothesis four was supported.

Table 8 clarified that the nurses applied the clinical pathway guideline with more competency on post intervention than preintervention (54.72 ± 5.65 VS 32.24 ± 5.65). Also, the pediatricians were more competent in clinical pathway guideline on post intervention (53.57 ± 7.39) compared to preintervention. Additionally, the mean score of pharmacist competency regarding clinical pathway guideline was 48.00 ± 2.82 on post intervention compared to 30.50 ± 7.77 on preintervention. Moreover, the dietitian achieved more competency score regarding clinical pathway guideline on post intervention (53.00 ± 1.58) than preintervention (33.60 ± 2.40). Furthermore, the physiotherapist competency score regarding clinical pathway guideline on post intervention was 57.66 ± 4.93 VS 21.00 ± 15.58 on preintervention. Therefore, there were statistical significant difference between competency score at pre and post clinical pathway guidelines sessions among multidisciplinary team.

Table (1): Distribution of study and control groups according to their Characteristics through the study period (n=60)

Characteristics	Study group (n=30)		Control group (n=30)		Statistical test	P –value
	No	%	No	%		
Age Mean ±SD	7.26±2.88		7.00±3.22		t =0.33 ns	0.73
Sex						
Male	15	50.0%	15	50.0%	X^2= 0.00 ns	0.60
Female	15	50.0%	15	50.0%		
Diagnosis						
Ventricular sepetal defect (VSD)	7	23.3%	10	33.3%	X^2=4.83 ns	0.78
Patent ductus arteriosis	8	26.7%	4	13.3%		
Aortic regurgitation	1	3.3%	4	13.3%		
Pulmonary regurgitation	5	16.7%	3	10.0%		
Sever aortic stenosis	3	0	3	10.0%		
Aortic coaraction	1	3.3%	2	6.7%		
Sever pulmonary stenosis	1	3.3%	1	3.3%		
Primary cardiomyopathy	2	6.7%	1	3.3%		
Secondary cardiomyopathy	2	6.7%	2	6.7%		

NB: *ns = not significant p<0.05,*= significant (p≤.05), ** = highly significant (p≤.01).*

Table (2): Distribution of nurses, pediatricians and other care providers according to their Characteristics through the study period

Characteristics	Nurses (n=33)		pediatricians (n=7)		Other care provider (n=10)	
	No	%	No	%	No	%
Age						
20-<25 years	18	54.5%	0	0.0%	0	0.0%
25-<30 years	11	33.3%	1	14.3%	0	0.0%
>30years	4	12.1%	6	85.7%	10	100%
Mean ±SD	25.45 ± 4.25		33.88 ± 4.48		37.20± 1.54	
Sex						
Male	5	15.2%	5	71.4%	7	70.0%
Female	28	84.8%	2	28.6%	3	30.0%
Level of experiences						
< 1 year	6	18.2%	0	0.0%	0	0.0%
1-<5 years	16	48.5%	1	14.2	0	0.0%
5-10 years	6	18.2%	3	42.9	4	40.0%
≥ 10 years	5	15.2%	3	42.9	6	60.0%

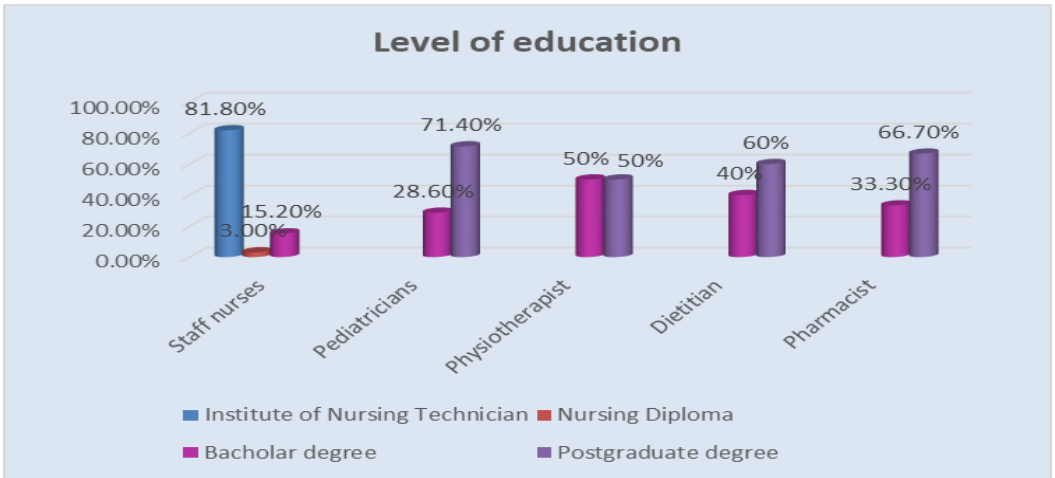

Figure (2): Percent distribution of qualification of studied clinical pathway team

Table (3): Comparison of hemodynamic status between the study and control groups as revealed by temperature, pulse, respiration, and mean arterial pressure (n=60)

Items	Days	Study group (n=30) Mean ±SD	Control group (n=30) Mean ±SD	t test	P –value
Temperature	1st day	36.53±0.27	36.46±0.29	0.92 ns	0.36
	2nd day	36.53±0.28	36.47±0.29	0.91 ns	0.36
	3rd day	36.48±0.24	36.49±0.23	0.11 ns	0.91
	4th day	36.43±0.25	36.46±0.29	0.38 ns	0.71
	5th day	36.49±0.25	36.49±0.25	0.05 ns	0.96
	6th day	36.49±0.25	36.48±0.25	0.21 ns	0.83
	Paired t test 1 P-value 1	2.57* 0.02	1.00 ns 0.33	-	-
	Paired t test 2 P-value 2	1.92 ns 0.06	0.48 ns 0.63	-	-
Pulse	1st day	89.80±5.73	96.66±6.29	4.4**	0.00
	2nd day	86.77±4.62	95.47±6.14	6.20**	0.00
	3rd day	84.97±4.54	94.17±5.98	6.71**	0.00
	4th day	82.60±4.17	96.53±4.86	8.49**	0.00
	5th day	80.93±4.31	91.53±4.78	9.02**	0.00
	6th day	79.30±5.06	96.03±4.71	8.50**	0.00
	Paired t test 1 P-value 1	13.30** 0.00	0.95 ns 0.43		
	Paired t test 2 P-value 2	5.13** 0.00	0.72 ns 0.52		
Respiration	1st day	35.77±3.17	36.0±3.39	0.29 ns	0.77
	2nd day	32.77±3.38	36.0±3.09	3.87**	0.00
	3rd day	30.57±3.39	34.47±2.76	4.88**	0.00
	4th day	33.67±2.55	36.57±3.26	6.76**	0.00
	5th day	24.57±3.26	32.53±2.58	10.50**	0.00
	6th day	21.13±2.75	36.23±2.28	15.47**	0.00
	Paired t test 1 P-value 1	11.76** 0.00	0.89 ns 0.38		
	Paired t test 2 P-value 2	12.81** 0.00	0.86 ns 0.39		
Mean arterial pressure (MAP)	1st day	83.97±0.96	91.47±2.97	13.16**	0.00
	2nd day	83.67±0.92	90.60±2.85	12.69**	0.00
	3rd day	82.70±0.79	90.23±2.53	15.57**	0.00
	4th day	81.80±0.92	91.87±2.16	18.79**	0.00
	5th day	81.93±0.87	89.20±1.97	18.47**	0.00
	6th day	81.10±0.55	91.43±2.08	18.68**	0.00
	Paired t test 1 P-value 1	11.64** 0.00	0.56 ns 0.25		
	Paired t test 2 P-value 2	4.03** 0.00	0.78 ns 0.53		

NB: *ns = not significant (p>.0.05) ,*= significant (p≤.0.05), ** = highly significant (p≤.0.01).*
t1&p1= comparison between 1st &4th day, t2&p2= comparison between 4th day & 6th day

Table (4): Comparison of hemodynamic status between the study and control groups as revealed by arterial blood gas values throughout the study period (n= 60)

Arterial Blood Gases(ABGs)	Days	Study group (n=30) Mean ±SD	Control group (n=30) Mean ±SD	t test	P –value
PH	1st day	7.42±0.006	7.42±0.006	0.00 ns	1.00
	2nd day	7.42±0.007	7.42±0.005	1.35 ns	0.18
	3rd day	7.42±0.007	7.41±0.005	4.68**	0.00
	4th day	7.43±0.005	7.42±0.01	3.25*	0.002
	5th day	7.43±0.004	7.42±0.01	2.64*	0.01
	6th day	7.44±0.007	7.42±0.173	4.09**	0.00
	Paired t test 1 P-value 1	6.99** 0.00	0.39 ns 0.30		
	Paired t test 2 P-value 2	7.58** 0.00	0.76 ns 0.53		
Pao2	1st day	73.16±1.42	71.57±1.63	4.05**	0.00
	2nd day	85.23±3.86	80.53±1.55	6.20**	0.00
	3rd day	85.30±4.75	84.60±1.43	0.77 ns	0.44
	4th day	89.77±2.45	79.60±2.66	15.41**	0.00
	5th day	90.43±1.98	70.60±5.49	18.63**	0.00
	6th day	91.57±1.77	71.47±2.84	42.71**	0.00
	Paired t test 1 P-value 1	33.85** 0.00	0.39 ns 0.00		
	Paired t test 2 P-value 2	4.87** 0.00	0.42 ns 0.23		
PaCO2	1st day	35.50±0.75	36.33±5.37	0.84 ns	0.40
	2nd day	35.80±0.49	36.51±0.66	4.72**	0.00
	3rd day	35.99±0.46	36.17±0.53	1.41 ns	0.16
	4th day	36.64±0.37	36.99±0.50	3.13*	0.003
	5th day	36.95±0.33	36.38±0.65	4.25**	0.00
	6th day	37.23±0.36	36.64±0.52	13.71**	0.00
	Paired t test 1 P-value 1	8.44** 0.00	0.67ns 0.51		
	Paired t test 2 P-value 2	6.94** 0.00	0.68** 0.50		
Sao2	1st day	87.57±1.45	86.43±0.73	3.82**	0.00
	2nd day	89.70±1.39	86.50±1.009	10.20**	0.00
	3rd day	91.28±1.82	91.10±1.12	0.47 ns	0.64
	4th day	92.82±1.35	86.60±1.48	17.02**	0.00
	5th day	94.13±1.41	88.13±0.94	19.43**	0.00
	6th day	94.62±1.22	86.78±2.63	29.95**	0.00
	Paired t test 1 P-value 1	18.33** 0.00	0.54 ns 0.62		
	Paired t test 2 P-value 2	5.98** 0.00	0.44 ns 0.65		

NB: *ns = not significant (p> 0.05) ,*= significant (p≤0.05), ** = highly significant (0.01).*
t1&p1= comparison between 1st &4th day, t2&p2= comparison between 4th day&6th day

Table (5): Mean of chest sound, edema, dyspnea scores among study and control groups

Variables	1st day	2nd day	3rd day	4th day	5th day	6th days	Paired ttest1	P1-value	Paired ttest2	P2-value
	X ± SD	X ± SD	X ± SD	X ± SD	X ± SD	X ± SD				
Chest sounds										
Study group	1.83±0.50	1.63±0.61	1.43±0.77	1.13±0.68	0.93±0.69	0.80±0.81	4.58**	0.00	1.50 ns	0.14
Control group	1.76±0.62	1.70±0.65	1.66±0.71	1.63±0.76	1.50±0.86	1.53±0.86	1.07 ns	0.29	0.64 ns	0.52
Independent *t test*	0.44 ns	0.41 ns	1.21 ns	2.67*	2.81*	3.40*				
***p*-value**	0.65	0.68	0.23	0.01	0.007	0.001				
Edema										
Study group	3.36±0.76	3.20±0.71	3.20±0.71	2.53 ±0.73	2.20±0.71	2.26 ±0.69	5.47**	0.00	1.54 ns	0.13
Control group	3.10±0.84	3.0±0.7	3.03±0.85	3.16±0.98	3.10±0.95	3.06 ±9	0.23 ns	0.81	0.79 ns	0.43
Independent *t test*	1.28 ns	1.03 ns	0.82 ns	2.82*	4.02**	3.65				
p-value	0.20	0.30	0.41	0.006	0.00	0.001				
Dyspnea										
Study group	4.33±1.09	4.16±1.20	3.86±1.13	3.56±0.67	3.36±0.92	2.90±1.74	3.28**	0.003	3.16*	0.004
Control group	4.36±1.44	4.20±1.34	4.13±1.33	4.33±1.42	4.13±1.33	4.16±1.44	0.20 ns	0.83	0.96 ns	0.34
Independent t test	0.11 ns	0.10 ns	0.83 ns	2.66*	2.27*	3.37				
p-value	0.91	0.92	0.40	0.01	0.02	0.001				

NB: *ns = not significant (p> 0.05) *= significant (p≤0.05), ** = highly significant (p≤0.01).*
$X^2$1&p1= comparison between 1st &4th day, $X^2$2&p2= comparison between 4th day&6th day

Table (6): Means of pain scores among study and control groups

Variables	1st day	2nd day	3rd day	4th day	5th day	6th days	Paired ttest1	P1-value	Paired ttest2	P2-value
	X ± SD	X ± SD	X ± SD	X ± SD	X ± SD	X ± SD				
Pain for small age (1-7 years)										
Study group (n=12)	3.91±1.37	1.50±0.67	1.25±0.75	0.58±0.51	0.33±.49	0.08±0.28	5.39**	0.00	2.56*	0.02
Control group (n=14)	3.92±1.07	3.14±0.86	3.57±0.64	3.57±0.85	3.21±0.89	2.78±0.69	1.09 ns	0.29	2.62*	0.02
Independent t test	0.10 ns	5.33**	8.45**	10.59**	9.84**	12.4**				
p-value	0.15	0.00	0.00	0.00	0.00	0.00				
Pain for old age (8-18 years)										
Study group (n=18)	2.88±1.36	2.0±1.18	1.50±1.09	1.16±0.78	0.27±0.46	0.05 ±0.23	4.36**	0.00	5.66**	0.00
Control group (n=16)	3.50±0.73	3.18±.83	2.81±1.10	2.62±1.14	1.81±1.47	1.93 ±1.43	2.40*	0.02	1.61 ns	0.12
Independent t test	1.59 ns	3.32*	3.46*	4.36**	4.20**	5.48**				
p-value	0.12	0.002	0.002	0.00	0.00	0.00				

NB: *ns = not significant (p> 0.05) *= significant (p≤0.05), ** = highly significant (p≤0.01).*
$X^2$1&p1= comparison between 1st &4th day, $X^2$2&p2= comparison between 4th day&6th day

Table (7): Mean of complications scores among study and control groups

Mean score of OAG	1st day X ± SD	2nd day X ± SD	3rd day X ± SD	4th day X ± SD	5th day X ± SD	6th days X ± SD	Paired ttest1	P1-value	Paired ttest2	P2-value
Cardiac complications										
Study group	3.90±2.23	3.73±2.18	3.46±2.30	3.40±1.58	3.36±1.63	3.33±1.70	2.92*	0.007	0.70 ns	0.48
Control group	4.26±1.89	4.16±1.96	4.03±2.05	4.20±1.24	3.90±1.37	4.16±0.83	0.27 ns	0.78	0.18 ns	0.85
Independent *t test*	0.68 ns	0.80 ns	1.005 ns	2.17*	2.13*	2.40*				
***p*-value**	0.49	0.42	0.31	0.03	0.03	0.02				
Respiratory complication										
Study group	1.76±0.77	1.66±0.80	1.60±0.81	1.50±0.50	1.23±0.43	1.03±0.18	2.11*	0.04	4.47**	0.00
Control group	1.90±0.80	1.96±0.76	1.90±0.80	1.24±0.43	1.53±0.50	1.30 ±0.46	1.53 ns	0.15	0.52 ns	0.60
Independent *t test*	0.65 ns	1.48 ns	1.43 ns	2.19*	2.47*	2.91**				
***p*-value**	0.51	0.14	0.15	0.03	0.01	0.005				
Renal complication										
Study group	1.60±0.62	1.56±0.56	1.46±0.50	1.40 ±0.49	1.36±0.49	1.30 ±0.46	2.40*	0.02	1.79ns	0.08
Control group	1.76±0.72	1.70±0.59	1.73±0.82	1.23 ±0.4	1.70±0.74	1.06±0.25	1.65 ns	0.14	1.90 ns	0.12
Independent *t test*	0.95 ns	0.88 ns	1.50 ns	1.38	2.03*	2.40*				
p-value	0.34	0.37	0.13	0.17	0.04	0.01				

NB: *ns = not significant (p> 0.05) *= significant (p≤ 0.05), ** = highly significant (p≤ 0.01).*
$X^2$1&p1= comparison between 1st &4th day, $X^2$2&p2= comparison between 4th day&6th day

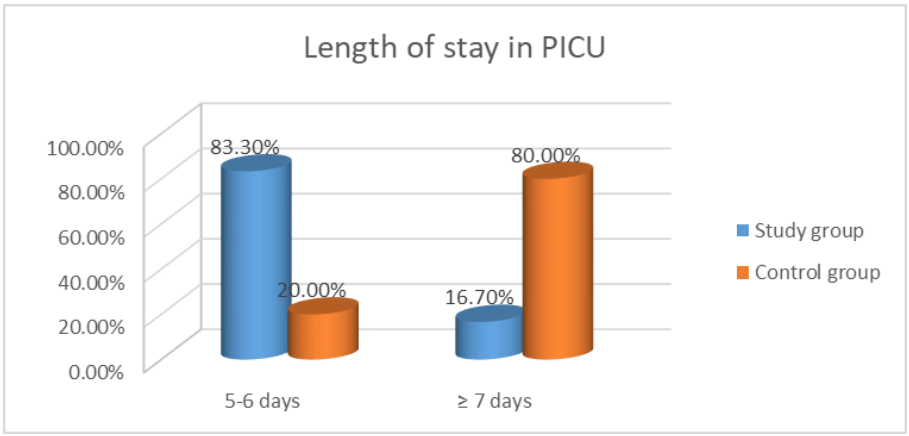

Figure (3): Comparison of the length of stay in PICU between the study and control groups

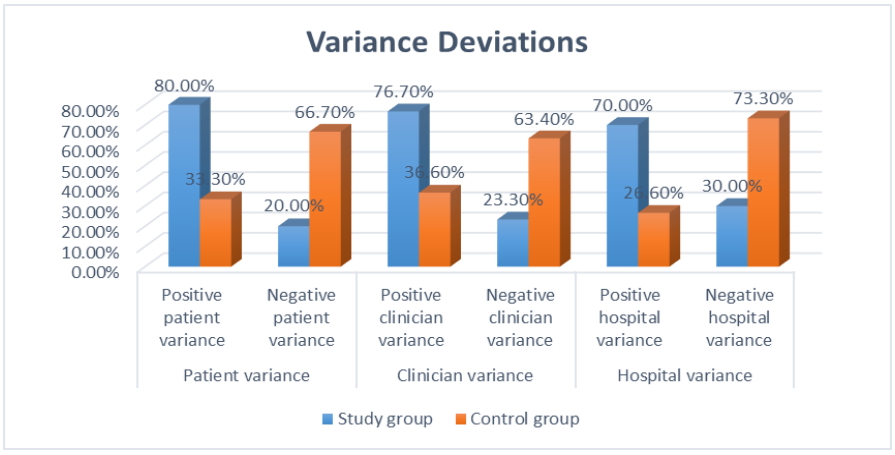

Figure (4): Comparison of variance deviations during hospitalization between the study and control groups

Table (8): Total Mean scores of nurse driven clinical pathway guidelines Competency among multidisciplinary team at pre and post sessions.

Variables	Pre Mean ± SD	Post Mean ± SD	Paired ttest	P-value
Nurses	32.24 ± 5.65	54.72 ± 5.65	19.85**	0.00
Pediatricians	35.71 ± 2.75	53.57 ± 7.39	5.89*	0.001
Pharmacist	30.50 ± 7.77	48.00 ± 2.82	5.35*	0.002
Dietitian	33.60 ± 2.40	53.00 ± 1.58	16.63**	0.00
Physiotherapist	21.00 ± 15.58	57.66 ± 4.93	5.46*	0.002

NB: *ns = not significant (p> 0.05) *= significant (p≤ 0.05), ** = highly significant (p≤ 0.01).*

Discussion

The core of patient safety and quality of care is for providers to follow a clinical pathway designed by multidisciplinary teams. Clinical pathway guidelines are designed by multidisciplinary teams to enhance patient outcomes, safety, satisfaction, and the integration of the multidisciplinary team's knowledge, skills, and experience in in order to elevate the level of care all through the healthcare continuum and to achieve maximum outcomes for the patients, nurses, families, and hospital system **(Jabbour et al., 2018).** The use of care based on clinical pathways in the hospital setting for the management of heart failure also has a negative impact on mortality rates during hospitalization, length of hospital stays, and readmission rates **(Foni, et al., 2020).** Therefore, the purpose this study was to determine the effect of application a nurse driven clinical pathway guidelines on the health outcomes in children's with congestive heart failure.

In relation to hypothesis one: the findings showed that regarding to patient's hemodynamic stability, the majority of both groups in the current study experienced tachypnea on day one in regards of respiration. Following that, from the second to the sixth day, there was a significantly greater stability in the study group regarding respiratory rate than in the control group. This stability could be attributed to the application of multidisciplinary clinical pathway interventions, such as breathing exercises, relaxation techniques, and coughing drills that reduce the work required for breathing. This was in agreement with Mohamed, et al.,(2018) who demonstrated that, although the respiratory rate may be quick to make up for lack of oxygen, it is low due to the body's lack of energy. So, when delivering oxygen, carefully assess the patients and keep an eye on them to make sure they are getting enough saturation.

Monitoring a patient's arterial blood gases is a crucial part of evaluating the patients. It enables quick testing close to the patient, providing crucial data about oxygenation, ventilation, metabolic balance, and a signs of lack tissue oxygenation **(Castro, & Keenaghan, 2019)**. Regarding arterial blood gases (ABG), the current study revealed that, compared to the control group, patients in the study group experienced a steady improvement in PaO2 and SaO2 mean values from the first to sixth days, with the exception of the third day. This beneficial outcome came about as a result of using clinical pathway guidelines such as: help patient in a high fowler's position while inhaling oxygen and promote rest intervals among workout stages. This result was consistent with Mohamed et al. (2018), who found that the mean PaO2 level between patients in the intervention group (receiving clinical pathway care) was considerably higher from admission to discharge. The study also showed that from admission to discharge, the intervention group's mean (SaO2) readings increased. A clinical pathway can be used to manage this in an efficient manner.

In relation to hypotheses two, concerning total mean scores of chest pain, the current study showed that a significant lower mean scores on exposure to chest pain attacks for young (1- 7 years) and old (8-18 years) children in study group subjects when compared with control group ones. this improvement came about as a result of ongoing nursing pain evaluation utilizing the Wong-Baker Faces Pain Scale (0–5), Word-Graphic Rating Scale (WGRS) (0–8), and using pain management strategies as well oxygen administration, elevation of the bed level, relaxation strategies and provide a quiet environment and pain relive medications. This result was consistent with the recommendations made by Gulati et al. (2021), who suggested that a thorough evaluation of a patient's chest pain assists in identifying the anticipated reason of the

chest pain and provides cues for fast and suitable actions to relieve the pain and manage the reason. For the comfort of both the patient and the nurses, it is crucial to maintain a quiet and controlled environment. Furthermore, regards case of chest pain a 12-lead ECG must also be performed and properly interpreted. An ECG can be used by health workers to determine whether a patient needs therapy to address the underlying cause of their chest pain.

Regarding to mean scores of dyspnea, the results of the present study showed that both groups started out with high mean scores of dyspnea and that these scores significantly decreased in the study groups as compared to the control group. This quick progress could be attributed to training the patient relaxation techniques and showing them how to utilize them, elevating the patient on the bed, and giving oxygenation while measuring their oxygen saturation with a pulse oximeter. The results of this study are consistent with a study by Mohamed et al., published in 2019, which found that patients in the study (who follow clinical Pathway care) and control (who follow hospital routine care) groups were distributed almost similarly in terms of dyspnea scores and that there were no significant differences between them at admission. The study also revealed that, as compared to the patients in the non-clinical pathway group, patients in the clinical pathway group experienced a statistically significant improvement in their dyspnea score.

In relation to hypothesis three, the findings revealed that there were statistically significant differences between the study and control groups and that the study group was less vulnerable to complications such as cardiac, respiratory, and renal complications. In terms of cardiac complications, it was found that most of the study group had no cardiac complications than the control group. This may be because clinical route standards have been followed, a multidisciplinary approach has been used, and ongoing ECG monitoring has been used to screen for abnormal heart rhythm. In terms of respiratory difficulties, the present findings showed a decrease in these complications from the study group's fourth to sixth days compared to their control group, with a statistically significant difference between the two groups. This might be as a result of the patient's multidisciplinary approach and post-assessment evaluation, which also includes monitoring the patient when they are using oxygen, breathing, and coughing.

Moreover in relation to renal complications, the present study found that there were improvements and a decrease in renal complications from the fourth day to the sixth day in the study group as compared to their control, with a statistically significant difference between both groups of children who were enrolled in the study and those who served as their controls. This can be as a result of the multidisciplinary team's comprehensive assessment of the situation and implementation of the necessary monitoring in accordance with the clinical pathway's criteria to avoid any consequences. Planning and maintaining and delivering the optimal quality of care and relaxation for patients with congestive heart failure require careful history and focus on physical examination and medical profile.

Current results are in line with those of Crane, (2021), who found that a monitoring and guiding program for CHF patients dramatically reduced the symptoms of complications such edema, difficult of breathing, tachycardia, arrhythmia, pulmonary cognition, chest pain, and gastrointestinal difficulties. Also, the findings support those of Tanjung and Nurwahyuni (2019), who showed that clinical pathway patients experienced less complications throughout their hospital stays. Additionally, Abouzied et al. (2017) investigated how the clinical care implementation affects the hospital complications faced by 60 adult patients. Patients in intervention group, when compared to those in the control group, experienced significantly less problems related to hospitalization. Delgado-Corcoran (2020) shown that the first step in delivering thorough HF care is correctly diagnosing those who have the condition in order to improve the patient's health status, minimize morbidity, and provide guidance on how to manage HF. Appropriate clinical examination and intervention should also be carried out without delay. These results, which are in accordance with Masarone's (2017) findings, showed how complex and interdisciplinary heart failure management requires. To conduct it at its best, anesthetists, cardiologists, highly competent nurses, and ancillary support workers like physical therapists and dietitians should collaborate. Care must be provided with extreme

attention to detail, regular patient reviews, a high index of suspicion for complications, and a methodical, rational approach in order to assure that patients are in the best possible health.

However, These findings, were in line with those of El Sol et al. (2021), who discovered that despite the pathway group experiencing fewer complications overall than the standard care group, both groups had comparable numbers of patients who had complications like chest infections, urinary tract infections, and pressure ulcers while they were hospitalized.

In relation to length of stay, the present study found that the clinical pathway guidelines for congestive heart failure had a beneficial impact on the length of stay for children in the pediatric intensive care unit (PICU); patients in the study group had shorter lengths of stay than patients in the control group. The participants in the control group, who were only managed according to regular PICU care, were discharged after more than or equivalent to seven days while those in the study group were discharged after five to six days. The clinical pathway guidelines, which enabled early identification and intervention of adverse events, nursing issues, or social problems that require a long hospitalization period, may be held responsible for the shorter duration in the study group subjects. These guidelines helped for the improving of patient outcomes while shortening the length of hospital stays.

The current study's results agree with those of Mohamed et al. (2018), who discovered a significant decrease in the group's length of stay (LOS) as compared to the group who received routine hospital care. This shortened time frame may be acknowledged for the deployment of interventions in accordance with the multidisciplinary team. Additionally, the current research was consistent with those of five clinical studies. Out of five research by (Mohamed et al., 2018), three studies demonstrated a significantly reduced length of stay (LOS) in the care pathway group, indicating that they are evaluating the impact of clinical pathways (CPs) on the length of stay. In comparison to standard care, the overall findings of these research demonstrated that the care pathway contributed to a beneficial reduction hospitalization stay (LOS).

Regarding peripheral edema, the present study showed that there was less mean scores of peripheral edema for the study group at the fourth and sixth days. The implementation of the clinical pathway guidelines, which comprised care elements linked to a healthy low salt and fat diet, fluid reduction, constant weight monitoring, as well as diuretics medication dose at the right time, may have helped the Clinical Pathway group improve. This result was in line with that of Mohamed et al. (2016), who found that while the majority of the study group showed no signs of edema, the control group's two-thirds needed 10–12 seconds to recover from a 6mm-deep pit.

Additionally, a study by Das (2018) discovered that Congestive Heart Failure (CHF) patients who were advised about the significance of regulating fluid intake and weight gain experienced a substantially lower level of edema. Recent nursing roles have placed a heavy emphasis on supporting and treating congestive heart failure, which has served to justify the establishment of clinics and support services for persons who are suffering from the problem. Cardiovascular conditions negatively affect patient outcomes, however organized nursing care using clinical pathway guidelines education is available **(Flocco et al., 2018).**

In relation to hypothesis four: the findings of the current study showed that the study group's patient/families had less negative variance of patient care than the control ones, indicating that they adhered to the care plan more closely. Additionally, the study group's patients experienced less hospital variability than the control group with a statistically significant difference between the two groups. This may be the result of interdisciplinary critical care teams using the sheet's modified clinical pathway instructions. The results of the current study are consistent with those reported by Mohamed et al. (2018), who found a substantial difference between negative system (hospital) variances and negative patient variances. Last but not least, patients with heart failure benefit from early detection, good observation, and care given by professional teams that comprise a nurse specialist on cardiology with the necessary training to maintenance ethical practice **(Hockenberry & Wilson, 2018).**

Limitation of study:

Some of the limitations of the study were small sample size, short follow-up time, and

single-center study design, which prevented the randomization of patients and thus limited the generalizability of the study.

7. **Conclusion:**

Children with congestive heart failure who exposed to a nurse driven clinical pathway guidelines application demonstrated a positive effect on their selected health outcomes such as; more hemodynamic stability, lower mean scores of chest pain, episodes of dyspnea and edema. Also, it contributed to no systemic complications in the majority of children with congestive heart failure who exposed to a nurse driven clinical pathway guidelines application than those who receiving routine hospital.

8. Recommendations:

- The clinical pathway care strategy needs to be supported and integrated into the Pediatric Intensive Care Unit at Menoufia University Hospital to enhance the effectiveness and quality of pediatric care and health outcomes.
- Replication of the study on large probability sampling.

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