



Nurse Interventions: A Means of Caring for Children with Tetralogy of Fallot after Surgical Repair

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Abstract

Caring is a concept that is coined from different perspectives and perceptions as related to the caregiver as well as the one to be cared for. Fallot's Pathology is a condition that is prevalent in Cameroon in particular and Africa in general. In these countries, care is certainly effective but the fact remains that a modeled caring approach towards children suffering from this pathology is still lacking. The author went out to search for which nursing interventions were shown and demonstrated by the nurses of the surgical heart center following surgical repair of children with Tetralogy of Fallot. This was a descriptive quantitative study conducted from the frameworks of Watson and Swanson. About 303 undergraduate nurses took part in the study and answered the questionnaires, selected through a non-probability convenience sampling technique. Descriptive statistics were used to convert and reduce data. Data was displayed and interpreted to arrive at intelligible impressions that could be further explored through descriptive and inferential statistics, after which information was processed statistically and explored for correlations or dissociations between the variables. This was done using SPSS software version 21.0 to analyse information gotten from the questionnaires. Furthermore, multiple corresponding analysis was used to present the results of the different caring behaviors for the questions with the Likert scale for nurse interventions slotted as items indicating "doing for" The results of this study, for each item of "doing for", the dominant modalities included agree with a percentage range of 51% to 66% and "tend to agree" with the percentage range of 31% to 39%. The results attested that caring is an action and an intervention, where direct care is delivered to the child either through an autonomous or collaborative approach. Concerning "doing for", the nurses attested that caring is an action and an intervention, where direct care is delivered to the child either via an autonomous or a col-

laborative approach. The results revealed three areas as towards point of laboratory care, as nurses embarked on monitoring blood gases, care towards techno-healing environment, as nurses tailored their observations towards the heart monitor.

Subject Areas

Nursing

Keywords

Nurse Intervention, Children, Surgical Repair

1. Background to the Study

Children born with heart defects might go unnoticed [1] stated that Tetralogy of Fallot (TOF) is one of the most significant cyanotic congenital heart malformations with a prevalence rate of 4 to 5 cases per 10,000 live births. The authors added that mortality rate among children aged 0-1 year remains high. Nursing interventions of children with congenital heart defects like tetralogy of Fallot should be defined and performed as soon as they are suspicious of the diagnosis [2] Multiple needs of children with TOF repair should be addressed by nurses via interventions like assuring maintenance and monitoring of cardiac output function, fluid and sodium levels, tissue oxygenation, oxygen consumption through an individualized nursing care plans [2]. According to [3] nursing care interventions for children with surgical repair of TOF should complement the nursing process through diagnosis and interventions that could promote the transversality of care beyond problem-centered approach. Interventions towards children with TOF repair are formulated in response to child/family and nursing diagnoses generated after proper assessment [4]. added that recent literature advocate interventions like fluid/electrolyte monitoring, nutritional monitoring, neurological monitoring, analgesic administration as prescribed together with respiratory function follow-up towards maintenance of stable hemodynamics.

Caring is a concept that is coined from different perspectives and perceptions as related to the caregiver as well as the one to be cared for. Nurses are human beings who spend their time beside the patients and adhere with the fact that caring is an innate concept to every person by virtue of their humanness, though expression, conception, perception, and expressions about it varies among individuals [5]. According to Watson's philosophy and theory of transpersonal caring, nursing consists of knowledge, thought, values, philosophy, commitment, and action, with some degree of passion. In this light, Watson calls on nurses to apply each carative factor and clinical caritas processes to describe the caring process of how nursing interventions could help a child with TOF repair to attain maximal health [6] [7]. Leininger's view is that the culturally based caring approach stands as an essence of nursing and a distinct, dominant, central, and unifying focus [7].

[8] Watson, 2006; [9] Alligood, 2014). In addition, Boykin and Schoenhefer stated that intentionality and authentic presence opens the nurse to know persons as caring and to support and sustain them in the process of living caring [9] [10].

Just like other authors have stated, Swanson stated that a universal definition about conceptualization of caring does not exist [9]. Caring is a virtue and depends on the components designed by the caregiver, which are very much based on the worldview of the nurse. Therefore, deepening on research around the context of congenital heart defects from the point of finding out what nursing interventions are demonstrated towards children with surgical repair could help reduce mortality among children and improve quality of their health.

2. Problem Statement

Falot's Pathology is a condition that is prevalent in Cameroon in particular and Africa in general. In these countries, care is certainly effective but the fact remains that a modeled caring approach towards children suffering from this pathology is still lacking. Surgical repair still remains the only aspect of management. In most developing countries, literature still shows few published studies in the area of caring sciences about what care is offered to children after repair, what proportion of the children were left on-operated upon, and/or what percentage of short or long complications developed. In addition, diagnosis of this condition might be difficult due to lack of diagnostic and technology-dependent equipment, human expertise, or inaccessibility. This leaves a handful of children dying. A child born to a family could serve as a moment of joy, excitement, discovery, or stress at times. Immediately news about the diagnosis of tetralogy of Falot, TOF, one of the congenital heart defects, CHD or malformation, the behaviour of the child and family alters due to potential hospital admissions and re-intervention procedures to be incurred. Africa is a multicultural environment where TOF, for many indigenes, would either have natural or supernatural causes or origin [11] [12].

The indigenous African tradition epistemology and cosmology affirmed that human existence and survival in the midst of complex uncertainties surrounding illness is a continuous search for meaning and self-fulfillment, whereby at the end of the search, meaning postulates beyond self-awareness [13]. The experiential moments of living with a child with TOF, characterized by periods of fainting, unexplained tiredness and breathing irregularities in the baby, instigate the quest for meaning through a commitment to a pluralistic approach to African philosophy related to search for disease definition, causation, and therapeutic itinerary. The rate of neonatal, infant, and children mortality related to parental respect of the African cultural values related to the pluralistic views about illness warrants an interface of caring where a nurse could clarify the fact that TOF is not a medically managed condition, prepare and nourish the parent of an African child's mind on the need and readiness for surgical intervention towards children living with TOF and model a caring approach post-surgical intervention via autonomous and collaborative actions.

Caring that embodies a child with surgically repaired TOF from the basis of the Swanson's and Watson's frameworks of caring would improve healing outcomes as nursing interventions are qualified as "doing for" in which nurses' caring actions help preserve life and dignity via caring actions, conveying predictions of what the children could do if they had the necessary will, strength or knowledge. [14] affirmed that several surgical treatment options for TOF do exist, but the debate on the table is to see which option could produce best lifelong outcomes. The author added that complete surgical repair with complete closure of the ventricular septal defect, resection of the infundibula muscle done with trans-tricuspid approach followed by resolution of pulmonary approach, whereby surgeons are said to use a prosthetic valve around the pulmonary annulus [14]. These leaves child with post operation risks like Therefore, the author went out to search for which nursing interventions were shown and demonstrated by the nurses of the surgical heart center following surgical repair of children with Tetralogy of Fallot.

3. Methodology Approach

3.1. Design

This was a descriptive correlational quantitative design conducted from the frameworks of Watson and Swanson. Watson's caritas processes enabled the researcher through a transpersonal relationship and sensitivity towards the child's needs so as to carry out better assessment and planning aiming at arriving at delivering quality nursing interventions. Swanson's approach provided the main component of the questionnaires with activities that shaped which nursing interventions were delivered to achieve healing outcomes. The study was carried out in Egypt geared towards identifying human caring behaviors which were demonstrated as nurse interventions on children operated due to tetralogy of Fallot.

3.2. Participants

Nurses selected for the study through non-probability convenience sampling technique had some criteria to be considered. Convenient sampling technique is quick and easy, though some researchers are for the idea that it predisposes the study to have lack of representativeness, potential to bias, and limited chances of generalizability. Possibility of bias was prevented by respecting the inclusion criteria of the participants, presented research results to the participants after data analysis, use of Wald statistic measures to valid results and use of inferential statistics other than just descriptive. Representativeness was ensured by applying an exhaustive method for data collection such that a greater population was met and received the questionnaires. The nurse should have completed an ongoing course on intensive care nursing through the hospital academic learning centre, in addition, the nurse should have had at least one year of experience in the surgical cardiac centre as a worker, and had demonstrated willingness to participate in the study. Excluded from the study included nurses of the surgical cardiac centre in Egypt who were not willing to participate in the study as their consent were not

gotten. About 303 undergraduate nurses took part in the study and answered the questionnaires.

3.3. Data Instrument and Data Collection

Data tool was built from the constructs of the caring concepts of Watson's human caring and Swanson's caring models. Apart from the sociodemographic factors, data collection tool used was a questionnaire which was adapted from the components of caring behaviors demonstrated during nurse-patient encounter. The questionnaire was generated from the constructs of Watson and Swanson's caring frameworks. The questions included sections that were related to therapeutic communication of openness to patient experience, mutual learning between nurse and child, optimizing therapeutic healing environment, and care of physical body as well as those related to the doing for concept of caring from Swanson's frameworks. The questions had altogether 20 items, each item was answered by ranking one's agreement or disagreement on a four-point scale: 1-disagree, 2-tend to disagree, 3-tend to agree, 4-agree. By circling one symbol (1 or 4) one indicated the level of agreement or disagreement.

3.4. Reliability and Validity

Reliability of the tool was assured by using Cronbach's Alpha coefficient and the calculated value of the coefficient was recorded at 0.858, a figure that is accepted in the research world as it is above the significant minimum level of 0.7. The article centered on quantifying the caring behaviors demonstrated by the participants as nurse interventions towards achieving optimal haling outcomes for children admitted for a surgical repair of TOF.

1. Internal validity

Internal validity is the degree to which the results are attributable to the independent variable or the outcome of the study and not due to some other source of explanation [15] [16]. It is highly influenced by the causal influence with the condition that the cause precedes the effect and correlation does exist between cause and effect. Internal validity was controlled by not attaching any monetary value or compensatory rivalry to the participants who took part in the study.

2. External validity

It explains at one point the extent to which the results of the study could be generalized to other populations. To reduce error from the setting or caring interventions, respondents from an environment (ecological validity) with the same characteristics was applied [17].

The content validity of the data collection instrument was ensured by presenting the questionnaires to a panel of experts to evaluate the content. The panel experts included the researcher's supervisors and other clinicians who have worked with children living with tetralogy of Fallot.

Face validity of the study was evaluated with the supervisor to see whether the questionnaires were able to measure how nurses in different cultures approach

caring and professional issues in nursing, as well as have the child's caregiver assesses the nursing care as perceived and felt. The supervisor was given a copy of the questionnaires to assess the present ability, consistency in the use of language, number of pages, and the font size of the questionnaires.

Piloting of the instrument: The stability of the questionnaires was maintained by carrying out pre-testing of the questionnaires in one of the facilities that is not included in the study but that do possess the same characteristics as the study. This helped in refining the format or scale of the study and provided the basis for rewording some questions if need be for proper understanding.

Criterion validity: Defined as the extent to which a measure is related to an outcome, with two components, and for this research we took concurrent validity where the caring behaviours or caring actions of the nurses, were compared with the caring outcomes as to how the state of health of a child living with a surgically corrected tetralogy of Fallot was evaluated and found. The sampled questionnaire was distributed and collected two days after. The researcher respected the work schedules of the respondents and answered their questions as need be. Only fully completed questionnaires was anonymously registered and analyzed.

3.5. Data Analysis

Descriptive statistics together with multiple correspondence factor analysis were used to convert and reduce data. Data was displayed and interpreted to arrive at intelligible impressions that could be further explored through descriptive and inferential statistics. Binary (or dichotomous) logistic regression made it possible to estimate the associations between a dichotomous qualitative variable (having two modalities: 0 and 1) called dependent variable and explanatory or independent variables. In this study, the dependent variable was caring which had two modalities (1 if yes and 0 if otherwise) meanwhile independent variables were factors that promoted healing for children with surgical repair of TOF like knowing, doing for and being there for the child. In addition, caring variable was created from the clinical profile of children like age at repair, clinical picture, estimated days at intensive care unit as derivatives of the child's hemodynamic level (stable hemodynamics denote positive caring-healing outcomes and vice versa. Moreover, Wald statistics was used to measure the statistical significance of each coefficient in the regression whereby H₀ reflected non-significance of the estimated coefficient and H₁ reflected the significance. H₀ of Wald statistics was to be rejected if calculated value is greater than 3.84, regression coefficient will be significant at 5% confidence interval. STATA software version 16 was used.

4. Results

Figure 1 revealed that cyanosis at birth, clubbing of fingers and hemodynamics were the most frequent symptoms in operated children with proportions of 89%, 88% and 80%, respectively. In particular, the hemodynamics are unstable in 8 out of 10 children. Arrhythmias and history of pulmonary HTN follow, which are ob-

served in two-thirds (notably 67% and 66%) of children. Tachycardia, squatting position and exertional dyspnea are moderately frequent symptoms (with proportions of 61%, 53% and 50% respectively) while heart murmur, systolic thrill, oppression in chest and post-exercise are the least frequent (26%, 22%, 18% and 10% respectively).

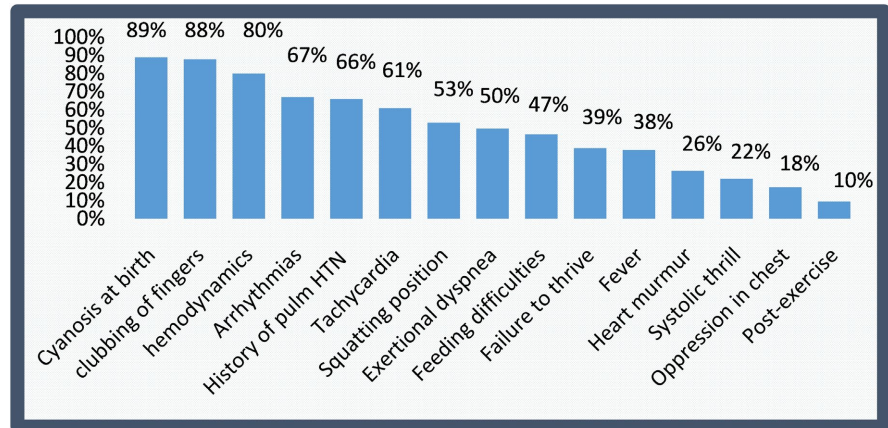


Figure 1. Percentage of children presenting each of the symptoms identified.

When nurses were said to deliver nursing care interventions like administering digoxin, monitor electrolytes regularly, maintaining and serve diuretics as ordered, and point of laboratory testing, including arterial blood gas monitoring, it was due to some circulation perturbations resulting to unstable hemodynamics. Nurses engagement in monitoring for altered levels of partial pressures of oxygen, carbon-dioxide, blood pressure and pulse to detect junctional tachycardia served as key nursing interventions towards detection and maintenance of hemodynamics.

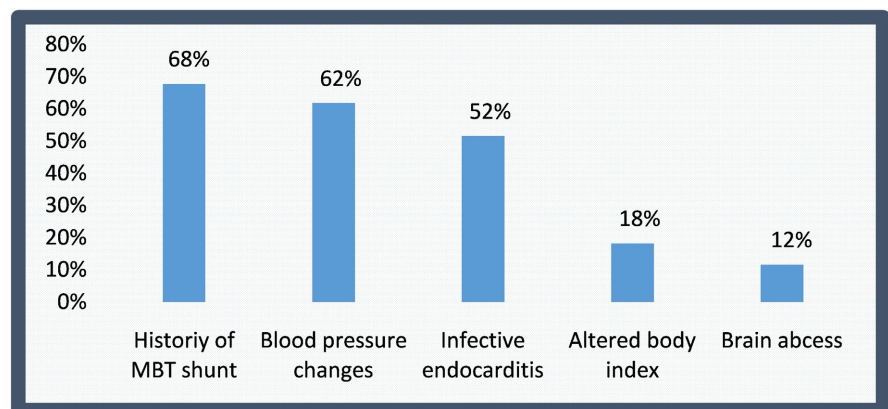


Figure 2. Distribution of children according to each past medical history.

From **Figure 2**, the most common medical history in operated children was history of Modified Blalock-Taussig (mBT) shunt, a palliative surgical procedure. In fact, more than two thirds, or 68% of children have had this antecedent. Blood

pressure changes and infective endocarditis are moderately recorded medical histories in children with respectively 62% and 52% as proportions. Nurse interventions involved engagement to reviewing plans of following up echography so as to detect heart murmurs early and initiate appropriate corrections.

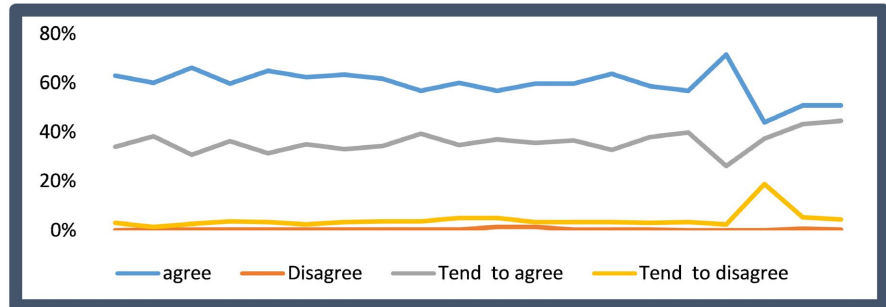


Figure 3. Description of nursing interventions as « doing for » for a child with Fallot.

The results of this study, for each item of “doing for”, the dominant modalities included agree with a percentage range of 51% to 66% and ‘tend to agree’ with the percentage range of 31% to 39% (See **Figure 3**). The results attested that caring is an action and an intervention, where direct care is delivered to the child either through autonomous or collaborative approach.

The study’s results revealed three areas of caring action: towards the point of laboratory care, care towards techno-healing environment, and caring as an action towards satisfying a child’s basic human needs.

The point of laboratory care action for nurses was centered on continuous point of checking levels of arterial (ABG) and venous blood gases (AVGs). The point of care laboratory for ABG is to evaluate levels of partial pressures of carbon dioxide (PaCO_2) and oxygen (PaO_2), bicarbonate levels in blood (HCO_3^-), oxygen saturation levels in blood, hemoglobin levels (Hb), sodium (Na^+) and potassium ions (K^+), red blood cells (RBC), and lactate levels (60% of nurses agreed for this care action while 38% tended to agree that this behavior was necessary and as an autonomous nurse-caring action. This enables the nurses to quickly detect changes like low oxygen saturation levels and high lactate and bicarbonate levels that mainly were observed during the data collection of this study. Collaborative actions included serving digoxin and diuretics as ordered, as per this study towards considering coordinated care.

Another exciting area indicated in the series of caring behaviors was care centered on establishing a technology-healing environment between the child and the nurse. Caring for children with corrected tetralogy of Fallot demands a need of mastery of monitoring device technology, especially around the heart monitor; the group of caring behaviors affirmed that 51% of nurses agreed and 43% tended to agree that technology mastery in the ICU of children with a surgically corrected Tetralogy of Fallot. 57% of the nurses agreed, and others agreed that creating a healing environment for the sick and the nurses themselves were essential. The

last important part of caring as action and intervention, as demonstrated by the different caring behaviors, is about satisfying basic human needs.

The results of this study showed an inclination towards the need for the child to breathe normally as indicated by a percentage of 60, whereby the nurses agreed, and 36% tended to agree that endotracheal tubing during immediate post-operation affects the child's breathing pattern, especially when they start feeling awake from the anesthetic products. Hence good surveillance is expected so as to extubate immediately as need be. In addition, immediately after surgical intervention during the few hours in the ICU, the child starts presenting with highly thickened secretions, the reason for which suctioning is done repeatedly and eventually pulmonary toileting or chest physiotherapeutic exercises, as 62% agreed and 35% tended to agree about the importance of pulmonary toileting.

The results of this study also demonstrated some behaviors related to satisfying the basic human need of "eat and drink". In effect, 62% of the participants of this study agreed, and 34% tended to agree that initiating discussions about nutrition as soon as consciousness regains for the sick child with surgically corrected Fallot was quite important. In the same vein, 59% agreed, and 38% tended to agree that as the child regains consciousness, frequent small meals with rest periods in between and high calories snacks are started from liquid to semi-solid and continue as tolerated.

Just as the result indicated by the study that eating is essential so does fluid. In the ICU wards one will hear of "negative balance", which in effect is a search for a relative stability of the internal environment following the amount of fluid infused during or before surgery and the fluid that the body strives to retain measured through input and output monitoring. In that case, caution is made towards diuretic usage post-operative (66% agreed and 31% tended to agree), weight monitoring with a restricted diet emphasized (57% agreed and 39%), electrolyte levels strictly observed and monitored (60% agreed and 35% tended to agree), as well as measuring abdominal girth regularly for signs and symptoms of peripheral edema (57% agreed and 37% tended to agree).

Moreover, the study also showed that skin care is a serious aspect to be considered for children operated on for TOF, just like for any patient coming out of the operating room or being admitted in the ICU ward. As autonomous caring behaviors and as tolerated by the child, the nurse focuses on providing care for edematous body parts and extremities (60% of the nurses agreed and 36% tended to agree), embark on frequent change of position as tolerated (60% of the nurses agreed and 37% tended to agree), and frequent inspection of skin for redness and skin breakdown over pressure points (64% of the nurses agreed and 33% tended to agree).

The study showed that for the three areas of care nurses who disagree completely fell within the percentage range of 0% - 1% and those who tended to agree 1% - 19%.

The study showed that air, feeding, fluids, ambulation, and need for good com-

munication, belonging, and remaining in a good relationship were highlighted (falling into either psycho-physical or biophysical basic human needs). Given that the child in the ICU is totally dependent on the assistance of the nurses, the need to create a healing environment was paramount or the children might be prone to abuse, neglect, and varied climatic or ward temperatures that are not conducive to healing. The nurse is considered the one who comforts, anticipates potential health problems, performs things that child could not do (due to either lack of knowledge, strength or will), and protects the child's mental, physical, sociocultural, and spiritual environment.

According to the results of this study, the nursing care intervention model based on Wald statistic measure was globally significant at the 5% level with the p-value of the likelihood ratio test (LR test) at $0.0149 < 0.05$. Thus, there was at least one explained variable among the clinical profile of the children, sociodemographic characteristics and professional behavior that orient the nurses act of knowing towards deciding which intervention to take towards determining hemodynamic state of healing of the child. According to the inferential statistics the variable coefficients "knowing, professional age and experience" were significantly positive at the 5% confidence interval, in which the p-value of the test of the coefficients was less than 0.05 (p-value was 0.034 for knowing, 0.041 for enabling, 0.025 for professional age, and 0.012 for experience). Thus, the more a professional adopts "knowing behavior," the more apt the professional becomes in the choice of which interventions to be delivered, hence the more the chances for the child to recover or presents with improved stable hemodynamic state. On the contrary, "doing for, being with and maintaining belief" positively affected the children's healing approach but were in a non-significantly way.

The receiver operating characteristics brought out a confusion matrix which represented the different combination of actual versus predicted values, alternating with true or false positives and negatives. The result of this study showed that positive 1 was the tendency that if hemodynamic state of the child after repair is stable, the possibility that the child will get well is higher, and negative 1 considered that if the hemodynamic state of the child becomes unstable after repair, the possibility that the child will not get well or recover faster is predicted.

5. Discussion

Surgical correction of TOF leaves a child with a quest to restore bio-psychosocial needs as the child's heart gradually resumes normal physiological functions. Within the first 48 hours of care, ICU nurses are committed to providing supportive, protective, and/or corrective mental, physical, societal, and spiritual environments to create a caring and healing environment [18] (Watson, 2007; Caritas Process # 8). This is an expanded view of Solomon's (2022) findings that echoed Swanson's caring concept of 'doing for' as comforting, anticipating, and being protective of other's needs. This paralleled the results of this study as the respondents pointed out that the "doing for" was a dominant modality, including agreeing

with a percentage range of 51% to 66% and “tend to agree” with the percentage range of 31% to 39%. The results attested that caring is an action and intervention in the area of point of laboratory testing of ABG, surveillance of mechanical ventilators and intubation to detect moment of extubation, as well as satisfying other basic needs of eating and drinking while striving to restore a negative balance [19]. testified that these are actions that lure nurses into practicing from a caring process point of view but added strongly that the caring process from Watson’s lens starts by establishing a caring relationship with patients, demonstrating unconditional acceptance using a holistic approach, spending time with patients to promote health via knowledge and intervention.

The point of laboratory care action for nurses was centered on the continuous point of checking levels of arterial (ABG) and venous blood gases (AVGs). This complied with what [20] said that routine care involves ruling out respiratory reasons of desaturation via DOPE (displaced, position, obstructed, pneumothorax, equipment failure), the nurse is advised to call for urgent echocardiography, perform arterial blood gas, and ask for chest X-ray, while calling for surgeon and cardiologist immediately. The findings of [20] complied with that of this study with an inclination towards need for the child to breathe normally as indicated by a percentage of 60, whereby the nurses agreed 36% tended to agree that endotracheal tubing during immediate post operation affected the child’s breathing pattern especially when they start feeling awake from the anesthetic products, hence good surveillance is expected to extubate immediately as need be. That is why [20] continued by saying that during routine care of children following TOF repair, child will require ventilation at least overnight, keep oxygen saturation between 70% - 85% (ideal 75-80% for TOF cases), prepare to generally wean oxygen therapy down-titrate to achieve SaO₂ 75-80%; engage on a 2-hourly point of laboratory blood gases for 4 hours and then 4 hourly if stable while considering weaning ventilation on day 2 if everything has been stable. [21] supported the view of [20] but added that deep breathing exercises routinely prescribed after TOF repair have shown positive effects in limiting on set of complications like lung collapse or atelectasis. [22] had an expanded opinion of [20] ideology about respiratory care as their work reported that ICU nurses on focusing towards surveillance of breathing pattern were engaging on interventions towards a nursing diagnosis of impaired spontaneous ventilation.

Nurse caring is manifested through different nurse caring behaviors towards children with TOF. In the post-surgical repair ward, demonstration of pulmonary toileting or respiratory care, together with administration of diuretics or digoxin as nurse interventions following observations on the heart monitor incorporate all five caring processes of Swanson’s caring model. The act of carrying out pulmonary toileting involves being with child and family. Moreover, identifying untimely need of pulmonary toileting either from cyanotic episodes on admission conveys willingness (doing for, or enabling), the observing, continuous observation and carrying out safety checks engages family and other team members in the

care of the baby. Meanwhile, acknowledging the preferences of others involved in the care advocate for knowing and maintaining belief caring processes. A nurse who engages in this act of doing for which corresponds with the perception and conception of the act via knowing and being there is creating an optimal environment of learning. This enables new parents or team members to be involved in health policies that could help parent of children with new diagnosis of Fallot Tetralogy to gain an opportunity to engage in meaningful decisions about follow-up care.

The results of this study demonstrated that the nurses had some behaviors related to satisfying the basic human need of 'eat and drink' of children with surgically corrected TOF. In effect, 62% of the respondents of this study agreed and 34% tended to agree that initiating discussions about nutrition as soon as consciousness regains for the sick child with surgically corrected Fallot was quite important. [22] elaborated on what Wei and Watson said as the authors reported that though professional actions like verifying level of oxygen saturation and notifying and/or going to ask a parent to express milk for her child in the intensive care unit, Wei *et al.* appraised these actions as caring. This complied with [23] voices that "doing for" is anticipatory in which the professional nurse initiates care early enough with interdisciplinary teams, consisting of advance planning in a multidisciplinary approach, educating and training other team members on effective communication skills, clarifying roles and responsibilities, not forgetting instrumental or emotional support from other caregivers.

However, [20] advocated that the feeding schedule be respected and could begin the day after surgery if everything has been stabilized and tolerated by the child's system. Post-operative fluid overload might be an independent risk factor for poor outcomes in neonates following cardiac surgery with cardiopulmonary bypass as it serves is a readily available non-invasive marker of renal function. [24] echoed that fluid overload may arise from hemodilution, cardiopulmonary bypass, fluid/blood product administration, low oncotic pressure and capillary leak, low cardiac output and impaired renal function. In the ICU wards, one will hear of "negative balance", which in effect, is a search for relative stability of the internal environment following the amount of fluid infused during or before surgery and the fluid that the body strives to retain measured through input and output monitoring. The results of this work concurred with the view of Wilder *et al.* by stating that caution is made towards diuretic usage post-operative (66% agreed and 31% tended to agree), weight monitoring with fluid restricted diet emphasized (57% agreed and 39%), electrolyte levels strictly observed and monitored (60% agreed and 35% tended to agree), as well as measuring abdominal girth regularly for signs and symptoms of peripheral edema (57% agreed and 37% tended to agree). Wilder *et al.* had stated clearly that twenty-one patients in their study experienced a poor outcome on postoperative day 3, together with a higher serum creatinine level (1.0 mg/dl versus 0.6 mg/dl; $p < 0.0001$), and that neonates with a poor outcome reached a higher level of fluid overload ($p = 0.05$) and took significantly longer

time to achieve negative fluid balance.

Nurse caring as demonstrated by Swanson's caring process, convey a sense of engagement, authentic presence and ignite an urge of responsibility among nurses. In this way caring from the lens of Swanson could be taught to students as to help immerse them in the culture of caring practice in order to promote, restore, and maintain an optimal functioning of a child with TOF repair.

Through logistic regression analysis of this study, the results proving that the resulting statistical model was globally significant at the 5% level with a p-value of the likelihood ratio test (LR test) is $0.0149 < 0.05$, confirmed that at least one explained variable among the clinical characteristics of the children, the sociodemographic characteristics and the behavior of the professionals which explains the state of healing of the children. This was not too far from the results of [25] study on the multidimensionality of caring using a confirmatory factor analysis of the Caring Nurse-Patient Interaction short scale proposed four aspects of caring like clinical, relational, humanistic, and comforting. The characteristic variables coefficients of "Knowing", "Enabling", "professional age" and "Experience" are significantly positive at the 5% level illustrated as the results of this study could be incorporated into the four aspects of care proposed by Cossette *et al.* towards care of children with surgical correction of TOF, given that their p-values were less than 0.05. Cossette *et al.* affirmed about humanistic and relational care as the significance of the knowing process, the act of striving to understand what it means to have had surgical correction of TOF as it adds meaning in the life of the child to be cared for or for the family member experiencing the situation.

[26] emulated the results of this study by affirming that there existed a significant relationship between the level of caring behavior as perceived by the patients and the level of patient satisfaction as proven by p-value of less than 0.05 (p-value, 0.042).

The result of this study identified skin care as a serious aspect to be considered for children operated on for TOF. [22] had an elaborate view and proposed that serious surgical wound monitoring, early identification of signs and symptoms, reviewing laboratory exams, and using aseptic and/or sterile techniques as precautionary means of prevention. Nurses involved themselves with strict surveillance and observations of cardiac monitors to detect unstable hemodynamics, which concurred with the results of this study by declaring that nurses provide care for edematous body parts and extremities (60% of the nurses agreed and 36% tended to agree) and frequent inspection of skin for redness and skin breakdown over pressure points (64% of the nurses agreed and 33% tended to agree). Embarking on frequent change of position aligns with literature [27] [28] added that by engaging in the inspection of skin frequently the nurse is conveying a systematic use of creative problem-solving in the care process and at the same time involving in the provision of the environment of support, protection, mental physical and socio-cultural and spiritual healing.

6. Conclusions

The article was accentuated by identifying the caring behaviors demonstrated by the bedside nurses of the surgical cardiac center in Egypt as nurse interventions for children with surgically repaired TOF. The underpinnings of the caring core concepts were that of Watson human caring and Swanson's caring models with a focus on the caring actions tailored as nurse interventions for children admitted and operated upon with TOF. Nurse interventions were activities related to a "doing for" component in the data collection tool.

Based on descriptive statistics, concerning "doing for", the nurses attested that caring is an action and an intervention, where direct care is delivered to the child either via autonomous or a collaborative approach. The results revealed three areas as towards point of laboratory care, as nurses embarked on monitoring blood gases, care towards techno-healing environment as nurses tailored their observations towards the heart monitor with a focus on monitoring and correcting hemodynamic parameters like oxygen saturation, junctional heart murmurs, and caring as an action towards satisfying child's human basic needs.

However, inferential statistics added that explanatory factors like knowing, professional age, and experiences of nurses were statistically significant as the coefficients p-values were less than 0.05 (p-value was 0.034 for knowing, 0.041 for enabling, 0.025 for professional age, and 0.012 for experience). Though 'doing for, enabling, and maintaining belief' as other caring processes of Swanson under study were not statistically significant, they affected positively the caring-healing outcomes of children with TOF after repair. Quality healthy outcomes were assured by the predictive values of +1 and -1 with reference to hemodynamic states of the child after TOF repair.

7. Implications for Nursing and Health Policy

Caring science and caring research are new areas of global interest, and many scholars are getting involved into them. Studies of caring approaches about congenital heart defects are increasing around Africa because of new technology orientated toward care, though Africa still lacks appropriate means for a handful of children to be diagnosed and surgically intervened. It was clearly shown from the results of the study that Watson Human Caring Theory and Swanson's formed the bases in caring for children with surgically corrected TOF through custom-made behaviors that were termed nurse interventions. However, more research still needs to be undertaken in conducting a hermeneutic qualitative study on family caregivers of children who just had TOF repair in order to incorporate their experiences in the care of these children.

Health policies resulting from nurse caring interventions towards children with TOF repair could be developed to improve incorporating the principles of Swanson and Watson's caring models to favor creation of healing environment. In addition, policies promoting individualized patient-centered care based on Watson and Swanson could improve patient satisfaction as promotion of a culture of car-

ing could contribute to improved quality healing outcomes of stable hemodynamics for children with TOF repair.

8. Ethical Considerations

Permission to collect data was obtained from the ethical commission of the hospital in addition to the national ethical clearance authorization. Participating in the research was optional and participants could drop out at any moment, and were presented a consent form to be signed in accordance with their voluntary will. They were made assured about professional confidential aspects of anonymity in handling their information with respect to utmost professional secrecy

9. Limitations

The limits of the present study mostly centered on the methodological approach. Concerning the inclusion criteria, the study was carried out among nurses of one belief system limiting the representation of a culturally diverse nature as it included nurses of one culture. The responses of the nurses could have varied had it been the study involved nurses of diverse cultures

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Conflicts of Interest

The authors declare no conflicts of interest.

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