UNIVERSITY of RWANDA

PERIOPERATIVE FLUIDS MANAGEMENT IN ELECTIVE MAJOR SURGERIES AT BUTARE UNIVERSITY TEACHING HOSPITAL IN RWANDA

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PERIOPERATIVE FLUIDS MANAGEMENT IN ELECTIVE MAJOR SURGERIES AT BUTARE UNIVERSITY TEACHING HOSPITAL IN RWANDA

By

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A Dissertation Submitted in partial Fulfillment of the Requirements for the Degree of MASTER'S OF SCIENCE IN NURSING (PERIOPERATIVE)

In the College of Medicine and Health Sciences

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DECLARATION

I hereby declare that this research project ‘‘Perioperative fluids management in elective major surgeries at one selected university teaching hospital in Rwanda’’ will be submitted for the Master’s Degree Nursing sciences In University of Rwanda is my own work and has not been submitted to any University in Rwanda for the award of any degree.

IRAFASHA Peter

Signed……..

Date……..

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My unqualified gratitude goes to God Almighty, The Merciful and The Provider, who generously gave me the endurance, resilience, foresight and thoughtfulness to undertake this study and to complete it to satisfaction.

I thank the Government of Rwanda, through the Ministry of Education and UR/College of Medicine and Health Sciences/School of Nursing and Midwifery, for establishing and running this Master of Sciences in Nursing (Perioperative).

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The administration of Butare University teaching hospital that allowed me to conduct this study.

The operated patients of Butare University Teaching Hospital for their commitment and contribution to the fulfillment of the study objectives by consenting for the study and following the instructions that were given.

Lastly I wish to acknowledge the contributions of all my classmates and friends for their genuine cooperation in sharing experience and knowledge toward the completion of this work. All of you who assisted me in different ways for the completion of my Master's studies, The Almighty God bless you.

ABSTRACT

Background: Globally over 312 million surgical operations are performed annually and the association between poor perioperative fluids management and postoperative mortality was reported and postoperative mortality and morbidity was high in poor perioperative fluid management. The perioperative goal-directed fluid strategy may reduce postoperative complications among patients undergoing major surgery.

Methodology:

The quantitative prospective design was applied to achieve the research objectives. The sample size of 133 patients operated in theatre of Butare University Teaching Hospital was used, representing the study population of 200 patients per month. A convenient sampling method was used in the present study.

The SPSS 21 was used to capture and analyze the data; both descriptive and inferential statistics was applied to assess the associations among various variables.

Results: The analysis of the findings from this study revealed the positive association between fasting period and dehydration status among patients underwent elective surgery at Butare University teaching hospital. The results show that 108 (81.2%), and 71(53%) are in class A of hydration status before and after surgery respectively, while 25 (18.8%), and 62(46.6%) are in class B before and after surgery respectively. The reason for being dehydrated after surgery was established to be due to long period of fasting before patients came to theatre including the time patient passed in surgical procedure and anesthesia. In this study Fasting for 12-18 hours was predominant with proportions of 72.9%.Over a quarter of the sample had comorbidity with the subject for surgery 26.3%.

Conclusion: This study revealed that patients operated at Butare University teaching hospital, were dehydrated in class B after surgery. The management of perioperative fluid is critically ineffective which cause the patients to be dehydrated after surgery. There is a need to improve the management of perioperative fluid for avoiding the complications related to ineffective administration and to continue to train the perioperative nurses in Rwanda for improving the practices in perioperative fluid management.

KEY WORDS

Major Surgery

Elective Surgery

Perioperative care

Fluids management

LIST OF SYMBOLS AND ACRONYMS

AKI: Acute kidney Injury

BP: Blood Pressure

BUTH: Butare University Teaching Hospital

CHUB: Centre Hospitalier Universitaire de Butare

CI: Confidence Interval

CMHS: College of Medicine and Health Sciences

CVP: Central Venous Pressure

ENT: Ear, Nose, Throat

GDT: Goal Directed Therapy

HR: Heart Rate

IRB: Institutional Review Board

IV: Intervenus

NS: Normal Saline

OR: Odd Ratio

%: Percentage

RL: Ringer Lactate

RRT: Renal Replacement Therapy

UR: University or Rwanda

USA: United States of America

UO: Urine Output

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DEDICATION

I dedicate this research to the almighty God, my beloved parents and family and fellow classmates for their kind collaboration to handle and accomplish this work.

CHAPTER ONE: INTRODUCTION

1.1. INTRODUCTION

The chapter one includes, the background to the research problem, main aim of study, research objectives, research questions, significance of study, definitions of key terms and concepts and subdivision of the project.

1.2. BACKGROUND TO THE STUDY

Over 312 million surgical operations are performed annually and globally. The association between poor perioperative fluids management and postoperative mortality was reported and postoperative mortality and morbidity was high in poor perioperative fluid management. A study done by Kudsioğlu, reported the increased mortality and morbidity with very high and low volume of perioperative fluid management
(Kudsioğlu, 2016).

Perioperative fluids management is an important part of overall surgical therapy. Proper administration of fluids is critical, especially in patients who undergo elective major surgeries. Body fluid composition may change in minutes or hours, resulting in impaired wound healing and homeostasis. Briefly, choice of strategy in intraoperative and postoperative fluid management may be significant. Recent study results suggest that fluids should be viewed as drugs that should be prescribed carefully, with attention to type, dose, and toxicity in order to maximize efficacy and minimize toxicity. Fluid optimization is important during the first postoperative hours. The application of the right kind of fluid therapy at the right time in the right amount is needed for optimal patient outcome(Kayilioglu et al., 2015).

The perioperative fluids management is based on individualized goal directed and is guided by advanced hemodynamic monitoring. Effective perioperative fluid management is associated with reduced length of hospital stay or long hospitalization after surgery and enhanced recovery (Mythen et al., 2012). The perioperative fluid management in major abdominal surgery is based on goal of hemodynamic stabilization and reported to be associated with reduction of postoperative complications(Türkan Kudsioğlu, 2016).

Even though preoperative fasting is mandatory, most of patients scheduled for major abdominal surgery can have clear fluids and/or administration of carbohydrate-rich drinks up to 2 hours before surgery; this will be helpful to patients as it reduce the fluid requirement to replace fluid deficits and dehydration from the time of fasting period and improve the patient outcome after surgery (Patel et al., 2018).

In Ireland they have reported that the perioperative goal-directed fluid strategy or goal directed therapy (GDT) may reduced postoperative complications and reduced hospital length of stay among patients undergoing major abdominal surgery. This study reported that a regular perioperative assessment of patients' fluids status and fluids requirement should be the milestone of perioperative fluid management during major abdominal surgery (Shields, 2018). Perioperative assessment of fluids requirement includes looking for physical signs of dehydration or hypovolemia, or fluid overload by physical assessment, regular monitoring of vital signs and urine output, however failure to do so is associated with hypovolemia and salt and water overload lead to adverse events, perioperatve complications and prolonged hospital stay. The excess fluid administration has been linked to acute kidney injury, gastrointestinal dysfunction, cardiac and pulmonary complications like pulmonary edema (Marsh and Brown, 2014) .

In USA, they have reported that perioperative fluid management should consider the replacement of deficits based on fasting hours, substitution of ongoing insensible loss by perspiration and third space loss.

However the consequence is a positive balance and weight gain which is commonly associated with severe complications. The common intravenous fluids that are recommended perioperatively are the crystalloids (Chappell et al., 2018).

In developing countries**,** a study done in Brazil 2016, reported that 50% of surgical related postoperative deaths resulted from poor nursing and anesthetic practice of perioperative fluid management, this study conclude that effective perioperative hemodynamic monitoring and fluid replacement are mandatory in major abdominal surgery (Khan, Siddiqui and Asghar, 2018).

In Africa, the poor perioperative fluids management is reported in Sub-Saharan Africa and the reported mortality rate from ineffective perioperative fluid management is 5% of surgical patients.

A study done in Uganda have shown that 37% of patients had the complications of pulmonary edema caused by poor nursing practice of perioperative fluid management (Khan, Siddiqui and Asghar, 2018).

In Rwanda, there is a scarcity of data regarding nursing practice on perioperative fluids management in elective major surgeries; therefore the present study is intended to reveal much data on perioperative fluid management in elective major surgeries at Butare university teaching hospital. At Butare university teaching hospital, the management of perioperative fluids is done by either anesthetists or nurses but is performed without basing on the type of fluids. The amount and quantity is given routinely where the fluid is given to the patient without considering the hydration status of patient if he/she need that fluid or not.

1.3. PROBLEM STATEMENT

Perioperatice fluids management impacts outcomes and has the great importance in deceasing complications during surgical procedure. The effective nursing and anesthetic practices of perioperative fluids management is to improve outcomes like controlling perioperative hypovolemia, maintain an effective circulating volume, prevent inadequate tissue perfusion, the maintenance of sleep, pain relief, muscular relaxation(Chappell et al., 2018) .

Perioperative fluids management with documentation of urine output among patients undergoing major abdominal surgery is reported to be of great importance in nursing practice because the perioperative and long-term mortality and morbidity is minimized (Marsh and Brown, 2014).

Nursing knowledge and practice of perioperative fluid management has improved in recent years however the choice of type of intravenous fluid in a various of clinical situations should be guided by an understanding of the physiological function of crystalloids and colloids, furthermore, there are few useful clinical outcome data to guide this decision (Boller and Boller, 2015).

The consequences of inappropriate IV fluids administration are prolonged and persistent dehydration, excess hydration and the imbalance of electrolytes. All consequences caused by mismanagement of IV Fluids during surgical procedure, should be reported like critical incident.

The decision about the choice of the volume of intravenous fluid to be administered perioperatively has been a subject of long debate than the choice of type of IV fluids, this is because perioperative IV fluids is commonly associated to many complications from IV fluid

overload (Chappell et al., 2018). Therefore, the choice of quantity of perioperative IV fluid should be based on goal directed fluids therapy to achieve the effective left ventricular stroke volume while avoiding fluids overload and associated complications. This is achieved by consideration of preoperative deficit from fasting time, IV fluid maintenance and replacement of ongoing perioperative fluids loss by insensible loss and blood loss (Strunden et al., 2017).

In post-operative patients, normal fluid balance is the result of effective perioperative fluid management leading to normal homeostasis on the other side poor perioperative fluids management increases the risk of fluid excess or deficit in the postoperative patient resulting to fluid overload or fluid deficit(Mooney, 2015 p.12-16).

In Rwanda, much effort has been done to improve health care provided perioperatively. However there is a scarcity of data about nursing or anesthetic practice of perioperatve fluids management. Therefore the present study is intended on perioperative fluids management in electives major cases at Butare University Teaching Hospital. This study was focused on the assessment of hydration status of patient in preoperative and postoperative period. At this hospital there is no perioperative fluid choice and therapy individualized, and no guideline on management of fluid in perioperative period where you find that many patients are dehydrated after surgery.

1.4. AIM OF THE STUDY

The aim of this study was to facilitate the improvement and effective perioperative fluids management in elective major surgeries before and after surgery at Butare University Teaching Hospital.

1.5. RESEARCH OBJECIVES

1.5.1 General Objective

The general objective of this study was to assess the perioperative fluids management in elective major surgeries at Butare University Teaching Hospital

1.5.2 Specific Objectives

1. To assess hydration status before and after surgery in elective major surgeries patients.
2. To find out the types and amount of fluids administered to patients during surgery.
3. To find out the association between client characteristics, fluids used /administered and hydration status in elective major surgeries patients.

1.6. RESEARCH QUESTIONS

1. What is hydration status before and after surgery in elective major surgeries patients?
2. What are the types and amount of fluids administered to patients during surgery?
3. What is the association between client characteristics, fluids used/administered and hydration status in elective major surgeries patients?

1.7. SIGNIFICANCE OF THE STUDY

This study is significant in three major areas:

Nursing research:

This study assessed the perioperative fluids management in elective major surgeries at Butare University Teaching Hospital.

Therefore by providing information on perioperative fluid management in elective major surgeries this will provide a basis to further researches. Example, further studies on improved the effectiveness of perioperative fluid management.

Nursing practice:

Results of this study will inform national healthcare policy makers through publication and the Butare University Teaching hospital' administration in particular, to recognize the necessity of effective perioperative fluid management hence providing reasons to develop appropriate measures to effective perioperative fluid management.

Nursing education:

The results of the study will be an added source of information to the existing literature on this subject as well as contribution to additional knowledge for effective perioperative fluid management.

1.8. DEFINITION OF CONCEPTS

Major Surgery:

Is any invasive operative procedure in which a more extensive resection is performed, e.g. a body cavity is entered, organs are removed, or normal anatomy is altered. In general, if a mesenchymal barrier is opened (pleural cavity, peritoneum, meninges), the surgery is considered major **(**Navarro, L. H. C. et al. 2015).

Elective Surgery:

Elective surgery or elective procedure is surgery that is scheduled in advance because it does not involve a medical emergency. Semi-elective surgery is a surgery that must be done to preserve the patient's life, but does not need to be performed immediately (Corcoran, T. et al. 2012).

Perioperative care

Is the care that is given before, during and after surgery. In this study, perioperative care refers to care delivered to patient from preoperative up to 24 hours after surgery (McCue, C. and Puxty, K. 2018).

Fluid management: defined as the promotion of FLUID BALANCE and prevention of complications resulting from abnormal or undesired fluid levels (Groeneveld, A. 2013).

1.9. STRUCTURE/ORGANIZATION OF THE RESEARCH PROPOSAL

This study is organized into 3 parts: main parts are made of title page, dedication, abstract, dedication, acknowledgement, table of contents, list of tables and list of acronyms and abbreviations.

1st the chapter one that includes the introduction, background, problem statement, aims of the study, research questions, significance of the study , definition of concepts, structure/organization of the study and conclusion to chapter one.

2nd Chapter two is the literature review that made of theoretical literature, empirical literature, critical review, research gap identification and conceptual framework.

3rd Chapter three is the methodology that includes, research design, research approach, research setting, population, sampling, data collection data analysis methods, ethical considerations, data management, data dissemination, limitations and challenges to study and conclusion to chapter three.

CONCLUSION OF CHAPTER ONE

The chapter one has presented the background, problem statement, purpose of the study, research objectives and questions, definitions and significance of the study. The next chapter will present the literature related to the study.

CHAPTER TWO: LITERATURE REVIEW

2.1. INTRODUCTION

The chapter two presents the existing literature about perioperative fluid management in patient undergoing elective major surgeries in surgical department.

The literature review is made of theoretical and empirical literature review; in addition to that, this chapter contains the critical review and research gap identification, theory on stress, conceptual framework and conclusion to chapter two.

2.2. THEORETICAL LITERATURE

Fluids therapy is an important aspect in the perioperative period. Intravenous fluids are required to maintain adequate hydration, blood volume and oxygen delivery. If we manage incorrectly, it is a significant cause of morbidity and mortality(Grocott, Gan, Ffarcs, & Mythen, 2015).

As a result, precise perioperative management of fluids and electrolytes is a fundamental

Part of a patient's overall surgical treatment, which can have a significant effect on perioperative morbidity and mortality (Bordeianou & Hospital, 2016 pp21).

The fundamental goal of perioperative fluid management is on one hand to achieve a balance between avoiding hypotension, impaired tissue oxygenation, and inadequate organ profusion that may be associated with too little fluid, and on the other hand to avoid interstitial edema and cardiopulmonary complications associated with fluid overload. Many textbooks recommend that patients undergoing major abdominal surgery receive preoperative crystalloid loading at 2 mL/kg/h of fasting, and then receive infusions of crystalloids at three to four times the actual blood loss. In addition, patients are frequently administered 4 to 8 mL/kg/h of crystalloid based on suspected insensible losses, such as third spacing and evaporation. This formula may result in basal crystalloid infusion rates up to 20 mL/kg/h. The rates are frequently titrated to obtain a urine output of 0.5 to 1 mL/kg/h(Bordeianou & Hospital, 2016 pp65-66).

Perioperative fluids management impacts outcomes and plays a pivotal role in enhanced recovery pathways. There have been major advances in understanding the effects of fluids therapy and administration during the perioperative period. Improving fluid management during this period leads to a decrease in complications, decrease in length of stay, and enhanced patient outcomes. It is important to consider preoperative and postoperative fluids

management to be just as critical as intraoperative management given multiple associated benefits to the patients. Preoperative hydration with carbohydrate drinks or clear fluid up until 2 h before surgery is safe and should be encouraged, as this helps improve metabolism, decrease insulin resistance, reduce anxiety, and reduce nausea and vomiting. During the intraoperative period, the goals of fluid management are to maintain euvolemia using an individualized plan for fluid and haemodynamic management, matching the needs for monitoring with patient and surgical risk through goal-directed therapy (GDT). The optimization of perioperative fluid management is critical to enhanced recovery pathways as it helps improve pulmonary function, tissue oxygenation, gastrointestinal motility, and wound healing (Makaryus, Miller, & Gan, 2018).

The effective perioperative fluids management in patient undergoing major elective surgeries is a great important point to perioperative management. The use of small amount of IV fluid is the source of circulating hypovolemia and dehydration, while fluid overload results from excessive perioperative fluid administration (Burns and Grove, 2017).

Signs and symptoms of dehydration are peeing or having very dark yellow pee, very dry skin, feeling dizzy, rapid heartbeat, rapid breathing, sunken eyes, sleepiness, lack of energy, confusion or irritability, fainting and for overload are noticeable swelling in the legs and arms (peripheral edema), Fluid in the abdomen (ascites), extreme generalized edema (anasarca) and swelling of the skin with the accumulation in the fluid-filled space that surrounds the lungs (pleural effusion).

Intravenous fluids are classified into two main types: Crystalloids and colloids. Each group has its own characteristics and moreover, each particular solution has its unique properties. Crystalloids consist of glucose, ringer lactate and sodium chloride (saline) solutions. They are the intravenous solutions that contain the electrolytes and other substances similar to that of extracellular body fluid; they are commonly used in hypovolemic status(Adams, 2014).

Saline solution containing 0.9 g of NaCl in each liter of water is defined as isotonic saline, and it is the most popular intravenous fluid worldwide. Some widely used saline solutions also contain one or more of these components: potassium, calcium bicarbonate, lactate, and glucose. Isotonic glucose solution contains 50 g glucose in each liter of water and it is defined as isotonic glucose. Glucose in these solutions is metabolized right after

administration and solvent is mixed into total body water. On the other hand, saline solution's high NaCl concentration serves to keep its solvent water in the extracellular compartment. However, any crystalloid solution can freely pass through double barrier of endothelium. This condition causes up to four-fifth of the infused crystalloid to distribute directly into the interstitial compartment (Makaryus, Miller, & Gan, 2018).

The common intravenous fluids that are used during perioperative fluid replacement are isotonic crystalloids like normal saline (Normal Saline 0.9%) however the different concentration of saline exists (example, the diluted normal saline like 0.45%), the normal saline can be used in different conditions like replacement of blood loss from accidents.

The hypertonic saline such as Saline at 3% or 5% are used to treat severe hyponatremia from water intoxication and severe hypochloremia. The commonly used crystalloid is Ringer Lactate (Hartmann's solution), however the glucose 5% is also considered as crystalloids and used sometime in case of hypoglycemia.Other types of intravenous fluids are the colloids (Haemacell, Gelofusine, gelatins, dextrans, and hydroxyethyl starches. …), these kinds of IV fluids are used perioperatively in case of severe hypovolemic shock from massive blood loss during major abdominal surgery (Karch, 2013).

The general perioperative fluids management considers, the fluid maintenance for IV administration, replacement of preoperative fluid deficits from fasting period and fluids replacement of perioperative blood loss, however others guidelines of perioperative fluid management that use the goal directed fluid therapy have been identified . For nursing practice of perioperative fluid maintenance follows the formula of 4, 2, 1, this means that the first ten kg of patient's body weight is multiplied by four ml of IV fluids, the second ten kg of patient's body weight is multiplied by two ml, the rest patient's body weight is multiplied by one ml (Segar, 2013).

The example a patient of 60 kg scheduled to undergo major abdominal surgery like explorative laparotomy, fasting is 8 hours so perioperative IV fluid maintenance is equal , First 10 Kg x 4 ml = 40 ml, second 10 kg x 2 ml= 20 ml then 40 kg x 1 ml= 40 ml hence preoperative IV fluid maintenance is to 100 ml per hours. Perioperative fluid management in major surgery considers, the replacement of preoperative fluid deficits from fasting period, the volume to be administered is obtained by multiplying the maintenance fluids by the number of fasting hours (Segar, 2013).

Back to the example above, the replacement of preoperative fluid deficits from fasting period is equal to 100 ml/ hour multiply by 8 hours which is 800 ml to be administered as follow, the

first hour of operation the patient receives a half of 800 ml plus 100 ml (400 ml+ 100 ml/ hour), during second hour, the patient receives a quarter of 800 ml plus 100 ml (200ml+ 100 ml/ hour) then patient receives a rest quarter of 800 ml plus 100 ml during the third hour (200 ml+ 100 ml/ hour). Perioperative surgical blood loss is replaced by estimation of blood loss and insensible loss estimated at 10-15 ml/ kg/ hour during surgical operation, by reference to the above mentioned example, if the surgical operation take three hours, the above calculated hourly IV fluids is supplemented by 80-120 hourly. However the replacement of estimated blood loss (counting the abdominal gauze = 100 ml of blood loss for each abdominal gauze and measure in suction bottle) is administered when the patient is hemodynamic unstable (Aditianingsih & George, 2014).

Perioperative fluids overload are reported in 17-54% of patients undergoing major surgery, and prolongs hospital stay, to increase morbidity (e.g. pulmonary edema) and to contributed to increased postoperative mortality, a study done in USA found about 50% of elderly patients undergoing major surgery developed at least one fluid-related complication due to perioperative fluid overload (Chappell et al., 2018).

The IV colloids administration was reported to be associated with high incidence of acute kidney injury that requires renal replacement therapy and increased ninety days postoperative mortality for patients receiving perioperative IV colloids, especially starches in comparison to patient receiving the crystalloids solutions (Strunden et al., 2011).

However, many researchers have reported that the perioperative restriction fearing the possible complications of IV fluid overload has led to postoperative hypovolemia and possibly hypovolemic shock from non replaced blood loss. (Harris et al., 2015).

The comparative study found a reduced complications, length of hospital stay, and faster bowel movement when perioperative fluid restriction was applied than formal perioperative fluid management, therefore a zero-balance perioperative fluid management is to be encouraged (Nisanevich et al.2012).

However, fear of perioperative hypovolemia from severe fluid restriction has led to the use of other perioperative fluid management approach that is the goal directed perioperative fluid therapy which bases on direct intravascular monitoring by, arterial wave form analysis, central venous pressure, or lactic acid measurement (Tomas Corcoran et al., 2012).

Furthermore, the goal directed fluid therapy uses dynamic parameters such as stroke volume or pulse pressure variation analysis as goals during perioperative fluid optimization, and

the goal directed fluid therapy has shown the improved outcome and reduce the overall complications associated to poor perioperative fluid management (Marsh and Brown, 2012).

2.3. EMPIRICAL LITERATURE

Perioperative fluids management has undergone tremendous improvement during last decades, and significant progress has been achieved for effective nursing practice of periopetive patient management. Perioperative fluid status monitoring, however, still the nursing practice in a subject of debate (Türkan Kudsioğlu, 2016).

A study done by Smorenberg, Ince, & Groeneveld, (2013) has reported and showed that the effective nursing practice of perioperative fluid managent is associated with fewer postoperative complications and shorter hospital stay. However continous perioperative patients monitoring of IV status is important to guide perioperative fluid therapy, this is known as goal directed perioperative fluid therapies (Smorenberg, Ince, & Groeneveld, 2013).

A study done by Marsh and Brown, reported that perioperative fluid management should rely heavily on algorithmic to estimate of the fluid deficit, IV fluid volume status, fluid loss, and basal fluid needs as a guidance of perioperative management. The advancement of technology have included sophisticated hemodynamic monitoring such as stroke volume as functional indexes to guide perioperative fluid management (Marsh and Brown, 2012).

The effective perioperative fluid management aims to maintain or restore circulation with an adequate fluid and electrolyte balance, favoring the postoperative patient's outcome, thus, the purpose of effective perioperative fluid management is summarized in maintenance of fluid balance (euvolemia) maintenance of electrolyte balance and to ensure of effective oxygen delivery to organs (Corcoran et al., 2012).

A study done by Tomas Corcoran, Rhodes, et al., (2012) has reported perioperative fluids overload has led to postoperative complications that includes poor tissue healing, wound infections and cardio-pulmonary complications, therefore the positive fluid balance should be avoided and zero-balance fluid therapy be accepted.

Although, issues of under or over fluid administration are commonly encountered in clinical settings, over fluid administration was reported to be reported in 17-54% of patients and was

associated with prolonged hospital stay and increased incidence of morbidity (e.g. pulmonary oedema) and mortality (Corcoran et al., 2012).

Proper and safe administration of fluids is critical, especially in patients who undergo major surgeries such as emergency laparotomies, bowel resections and hepatectomy procedures was associated with improved patient 'outcome. Briefly, choice of strategy in intraoperative and postoperative fluid management may be significant affected by various factors (Strunden et al., 2011).The effective perioperative fluid management involves many calculations that includes calculation of fluid maintenance by 4, 2, 1 formula and calculation of preoperative fluid deficit so the calculation require nursing knowledge and practice, this was reported to be barriers to the effective perioperative fluid management particularly inexperienced nurses (Navarro et al., 2015).

A study done by Voldby and Brandstrup has shown that the nurses with low level of education are likely to practice the poor perioperative fluid management due to limitation in many calculations of perioperative IV fluids (Voldby and Brandstrup, 2016). Working in stressfull condtions with heaveay workload was reported to be associated with ineffective perioperative fluid managent There is a study which found that when many patients are scheduled for surgical operation, the likelyhood of poor perioperative fluid management increases (McCue and Puxty, 2018).

Other factors that was reported by surgical nurses is the limited material in operating room, sometime the IV fluids to be administered are scarce leading to a limited use of IV Fluis, a study done has reported that the limited resource is the possible causes of poor IV Fluid administration (Aditianingsih and George, 2014).

Perioperative fluid management plays a key role in providing adequate tissue perfusion, stable hemodynamic and reducing morbidities related with hemodynamic so understanding body fluid physiology and possible outcomes of different. Fluid management strategies is crucial for effective perioperative fluid management, this require nursing expertise so the lack of surgical experience and low level of eduction were reported to be associated with ineffective perioperative fluid management (Strunden et al., 2011).Maintenance of intravascular euvolemia throughout the perioperative period is ideal. Both hypovolemia and hypervolemia are associated with increased postoperative morbidity(Scott, 2012).

Absolute or relative hypovolemia is common in the perioperative period due to preoperative dehydration; vasodilation caused by anesthetic and adjuvant drugs, and surgical bleeding, this lead low cardiac output and decreased tissue perfusion and, if severe, can lead to shock and multi organ failure (Corcoran et al., 2012). The respiratory effects are the increased extravascular fluid in the lung tissue that can impair oxygen exchange and increase risk for postoperative respiratory failure and pneumonia, some patients develop frank pulmonary edema, particularly those with a history of heart failure (Corcoran et al., 2012). Other consequences are gastrointestinal effects with the increased extracellular fluid in the bowel can lead sequentially to gastrointestinal edema, decreased gastrointestinal motility, and possibly ileus (Corcoran et al., 2012). Many researchers have investigated on perioperative fluid management and reported that the effective nursing practice on perioperative fluid management is of a great importance , however those studies are limited in reporting the extent of effectiveness of perioperative fluids management and the factors that may hinder the effective nursing practice of perioperative fluid management (Chappell et al., 2008).

Even though the nursing knowledge and practice of perioperative fluid management has improved in recent years however the data on how perfect the nursing practice of perioperative fluid administration are limited (Boller and Boller, 2015).

The studies reported that the decision about the choice the volume of intravenous fluid to be administered perioperatively has been a subject of long debate than the choice of type of IV fluids, this is because perioperative IV fluids is commonly associated to many complications from IV fluid overload (Chappell et al., 2008).

Therefore, the choice of quantity of perioperative IV fluid should be based on goal directed fluids therapy to achieve the effective left ventricular stroke volume while avoiding fluids overload and associated complications. This is achieved by consideration of preoperative deficit from fasting time, IV fluid maintenance and replacement of ongoing perioperative fluids loss by insensible loss and blood loss (Strunden et al., 2011). However, these studies are limited in specifying of which fluid and how much to administer during perioperative fluid management, therefore the present study will assess the nursing practice and the factors affecting perioperative fluid management.

In Rwanda, many efforts have been done to improve health care but particularly in management of perioperative fluids there is remaining gap. However there is a scarcity of data about nursing practice of perioperatve fluid management, therefore the present study is

intended to assess the nursing practice and the factors affecting perioperative fluids management in major among surgical nurses.

This study assessed the hydration status of elective major surgeries patients and this will help in improvement of practice of perioperative fluid management in major surgery among the nurses working in operating room; moreover. It helped to find out the types and amount of fluids administered to patients during surgery and we have seen the association between client characteristics, fluids used /administered and hydration status in elective major surgeries patients.

2.4. CRITICAL REVIEW AND RESEARCH GAP IDENTIFICATION

It has been approved that the perioperative fluids management is helpful to the patient before surgery but its practice is inadequate . Fluid therapy is fundamental to the practice of intraoperative anaesthesia, but the precise type, amount, and timing of its administration is still the subject of extensive debate. Almost all patients presenting for general anaesthesia will be administered some form of i.v. fluid. Evidence is increasing that perioperative fluid therapy can affect important longer-term postoperative outcomes(Doherty & Buggy, 2012).

In one study they reported that a poor knowledge of physiology of fluids and electrolytes in health and illness leads to inappropriate and inadequate fluid prescribing, which is likely to increase the risk of fluid related complications. This is especially true for junior doctors who carry out the majority of fluid prescribing(Standards & Committee, 2014).

They stated that IV fluid related complications should be routinely reported. They showed that the incidence of IV fluid related complications is unknown due to lack of reporting. Increased scrutiny and the associated learning from clinical incidents could further drive improvements in practice, reduce the morbidity and mortality, which will bring improvements for patients and reduced costs(Standards & Committee, 2014).

Although perioperative fluid management remains a highly debated subject, data suggests that goal-directed fluid therapy with the objective of hemodynamic optimization can reduce complications after major surgery. Specific hemodynamic goals include maintaining adequate circulating volume, perfusion pressure, and oxygen delivery. Lack of standard criteria for perioperative fluid therapy results in significant clinical variability relative to its administration (Navarro et al., 2015).

The fluids should be considered and treated as any other intravenous drug therapy, and thus, careful consideration of its timing and dose is mandatory. A perioperative fluid plan should be developed respected which is easily understood and used by all anesthesiologists within a group, facility, or healthcare system. Determining both the need for augmented perfusion and fluid responsiveness is fundamental when making fluid therapy decisions to avoid unjustified fluid administration. Balanced crystalloid solutions should be given for short duration/low-risk surgical patients. Procedures of higher complexity are best managed with a combination of crystalloid and colloid therapy(Navarro et al., 2015).

Therefore, by analyzing and reading on recent studies and information reviewed in various articles, it appears that there are gaps in how nurses manage fluids in perioperative patient. Currently, there is the inappropriate perioperative fluid utilization in perioperative patients which cause some complications to the patients and causes negatives outcomes after surgery (Navarro et al., 2015).

It is important that perioperative physicians should be encouraging patients to increase PO hydration up until 2 h prior to surgery, which has been proven to be safe and adheres to strict NPO guidelines. Similarly, in the postoperative period, patients should be encouraged to start PO hydration early, and excessive i.v. fluid administration should be avoided.

2.5. CONCEPTUAL FRAMEWORK

In this study the conceptual framework presents the relationship between several concepts, and factors. These are concepts of perioperative fluid management in elective major surgery.

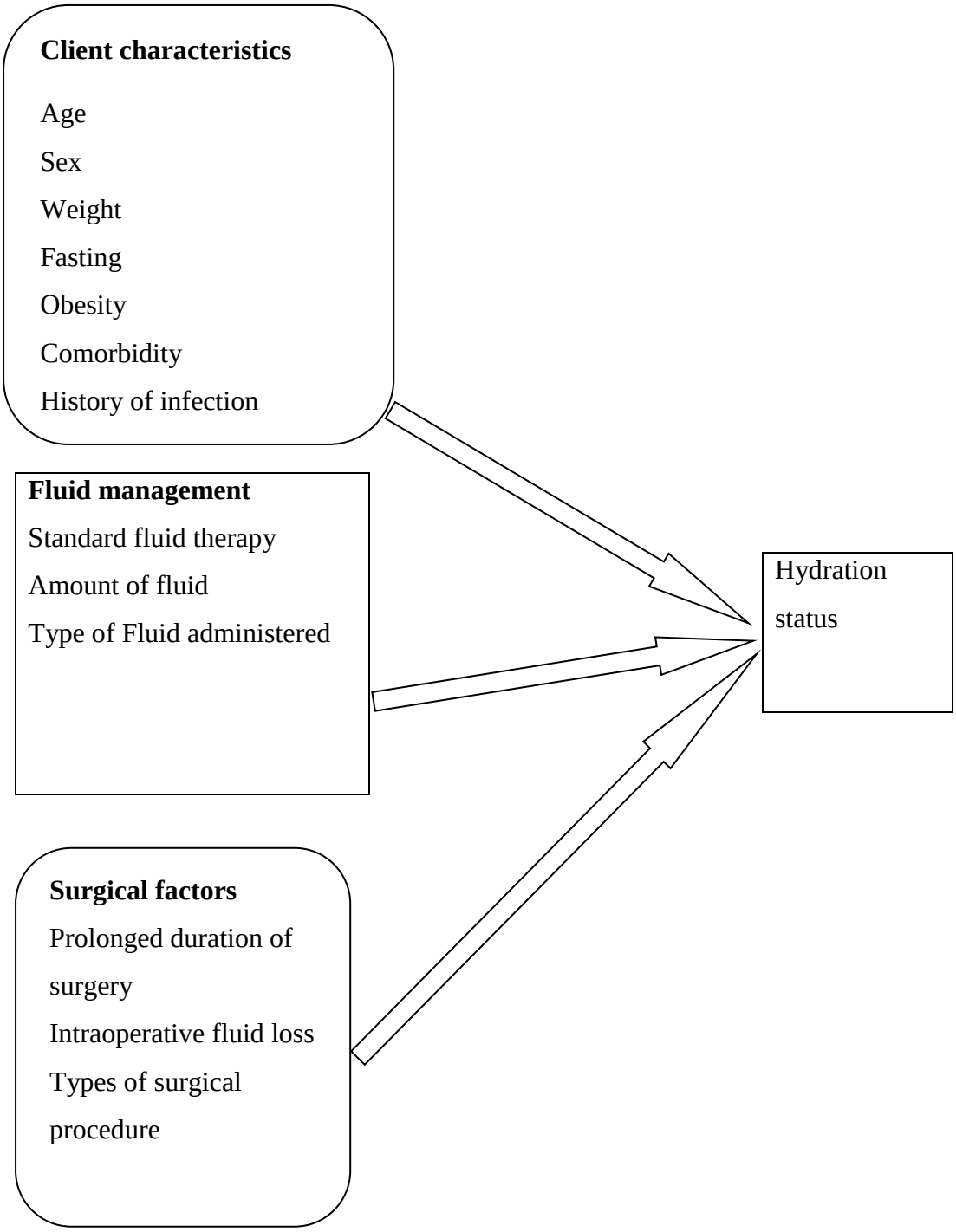

Figure 1: 2.1: Conceptual framework

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. INTRODUCTION

The chapter three was the research methodology; it presented the process and methods that was used to conduct this research.

It was included a study design, research approach, study population, sample size and sampling methods, data collection methods and procedures, data analysis, study limitation and problems, and ethical consideration.

3.2. STUDY DESIGN

The descriptive prospective design was used to conduct this research. This was done through checking whereby the researcher checked and analyzed operated patients and their files. The researcher was used checklists to record the information on perioperative fluid management in elective major surgery patient at the University teaching hospital of Butare, south Rwanda. Assessment of patients before and after surgery and checking of theirs files was used to record all information.

3. 3. RESEARCH APPROACH

The quantitative approach was used in this study. It was the study that involves the statistical measurement (numbers) or numerical analysis of data (Navarro, L. H. C. et al. 2015).

3. 4. STUDY SETTING

This study was conducted at Butare University Teaching Hospital in Rwanda. Butare University Teaching Hospital is situated in HUYE district, Southern province. It is a university teaching hospital with 511 staff and 490 beds. Butare University Teaching Hospital started its health services from 1928, by the time, it was the Butare hospital. It was built by Belgian colonization. Butare Hospital became a University Teaching Hospital in 1966. The operating theatre at BUTH is made of 5 operating rooms and 1 recovery room, hosting 44 nurses combined with anesthetists and it has an average of 200 surgical procedures per month.

3.5. STUDY POPULATION

The study population made of the elective major surgery patients operated in main operating theatre of Butare University Teaching Hospitals.

3.6. SAMPLING

3.6.1 Sample size

Data collected on 133 of 200 operated patients who underwent surgery throughout 1 month's period during working hours.

3.6.2 Sampling strategy

Convenient sampling strategy was used, whereby all operated patients in operating theatre during working hours through a period of 1 month (May 2019) were eligible to this study until the desired number was reached. This number is from a population of 200 patients operated every month and was calculated using the following formula developed by Yamane in 1967 (Israel 1992 p4).

$n = \frac{N}{1+N(e)2} = \frac{200}{1+200(0.05)2} =$ 133 Where ***n*** is the sample size, N is the population size, and e is the level of precision.

Inclusion criteria

The inclusion criteria were made of patients operated in period of 1months from 01 to 31 May 2019 in operating theatre at Butare University Teaching Hospital after calculating sample size.

Exclusion criteria

Emergency surgeries

Minor surgeries

Pediatric patients

3.7 VALIDITY AND RELIABILITY OF RESEARCH INSTRUMENT

To ensure validity of the data collection tool, the study tool corresponded to the reach objectives and conceptual framework. The pilot study conducted at Butare University Teaching Hospital, and the checklist was used to collect all information about perioperative fluid management in elective major surgeries, then the collected data was analyzed to evaluate the reliability and validity of the data collection tool.

3.8. DATA COLLECTION

To achieve the study's objectives, the checklist was used in one month and was used to collect data about perioperative fluid management on elective major surgery operated patients.

The final data collection tool was made of two sections; the first was made of client characteristics data, the second was made of different approaches in use for perioperative fluids management.

After getting ethical clearance from IRB/CMHS, the researcher applied for permissions to conduct research from BUTH ethical committees. Once permission obtained, the researcher met the unit managers of operating theatre and surgical ward to introduce himself and explain the study's purpose and ask permission. Then researcher was meet patients before and after surgery. After a self introduction to them, the researcher was provided detailed information on the research about and the willingness and to participate. Those willing to participate in the study was sign the consent forms, and then the researcher was permitted to assess their hydration status and complete the checklist trough the whole course of the process. The researcher has checked files of those patients before and after surgery in order to get information about perioperative fluid management for elective major surgeries operated in operating theatre of BUTH from period of study.

The data collection was done through assessing of hydration status of patient and checking their files then he has filled whether the elements of the process and information provided on the checklist, and circling the corresponding answers (yes or no). This was done during regular working shifts from Monday to Friday 7am to 5 pm.

To prevent biases, patient involved in this study, was kept ignorant about the content of the checklist, however they was informed that a study was conducted on them to explore their hydration status.

3.9. DATA ANALYSIS

Data were analyzed using SPSS 21. Descriptive statistics (frequency, percentages, mean and standard deviation) was computed and summarized in the form of tables and graphs. Then inferential statistics (Chi-Square) was used to determine the associations between variables like patient's data, surgical factors, and perioperative management and hydration status of operated patients.

3.10. ETHICAL CONSIDERATIONS

The researcher applied for ethical clearance from IRB/CMHS and permission to conduct research from BUTH ethical committee. To ensure anonymity and confidentiality, names of patient's files who participated in this study was not appear on the checklist. There is no any harm which was resulted from this study and the benefits are general to the whole population as quality improvement programs.

3.11. DATA MANAGEMENT

Completed checklists are kept in a locked cupboard in a secured room, which will be accessed by authorized people only. The soft copies are stored on external disk, kept confidential and will be used for the purpose of research. Data interred in computer for procession and analysis will be kept in the researcher's personal computer and secured with password.

3.12. DATA DISSEMINATION

The result of this study will be presented to the CHUB administration and University of Rwanda (UR) a copy will be provided to each of these institutions. Then the results of this study will be published in order to be accessible to the user as needed and the researcher will provide feedback to the study setting in order to facilitate them to set strategies to improve the nursing practice of perioperative fluid management.

3. 13. LIMITATION AND CHALLENGES

Limitations include but are not limited to generalizability as it would be conducted in only one referral hospital. Further limitations and challenges were identified through the course of the study. In this study some problems encountered for instance delay to get permission to collect data from study settings; this anticipated on finishing the research proposal as early as possible and gets enough time to wait for permission. As we have to follow large numbers of subjects study for a long time, being expensive without funding and time consuming this has delayed the time of finishing. Other limitation is that this study is for academic purpose.

3. 14. CONCLUSION OF CHAPTER THREE

The chapter three described the procedures and instrument that was applied by researcher to answer the research questions.

CHAPTER FOUR: RESULTS

4.0 INTRODUCTION

This chapter describes the results of information obtained from structured checklist on perioperative fluid management in elective major surgeries in Butare University Teaching Hospital and how the findings of this study met the research objectives. The researcher observed patients admissions during a period of 1 month throughout the regular hours of the weekdays. During that period, 133 patients were assessed in researcher's presence.

This chapter summarizes the socio-demographic and clinical information of the participants, and the association between the characteristics, fluids administered to the client and hydration status before and after surgery.

4.1. SOCIODEMOGRAPHIC AND CLINICAL INFORMATION OF PARTICIPANTS

Socio-demographically, this study was conducted on a sample of 133 clients who underwent major surgeries at University teaching hospital of Butare. Table 1 shows the mean age of participants was around (42.80%) and mean weight was (67.6%). The mean amount of intraoperative fluid loss was 218.4ml, while fluids received were 2091.7ml. Nearly two third of the study sample were females 81(60.9%) and around one third were males 52 (39, 1%). Fasting for 12-18 hours was among 97(72.9%), and a quarter fasted for 6-12 hours. Participants underwent different surgeries including 42 (31.6%) who underwent orthopedic surgery, followed by obstetrics 26(19.5%) and gynecology 10(19.5%), 19(14.3%) ENT surgery and 18 (13.5%) laparotomy. Skin/plastic surgery was in a small proportion of 6%. Fasting for 12-18 hours was predominant with proportions of 72.9%. Over a quarter of the sample had comorbidity with the subject for surgery 26.3%. A half of participants underwent operation procedure that last around 90-120 minutes (Table 1)

Table 1: Sociodemographic and clinical details of participants summarized with Mean and standard deviation

Variable (N=133)	Mean	Standard deviation
Age	42.80	17.5
Weight	67.62	9.5
Amount of intraoperative fluid loss	218.42	131.9
Amount of fluids received	2091.73	803.6

Table 2: (Cont'd). Sociodemographic and clinical details of participants summarized with frequency and percentage

Variables	Frequency	Percentage
Sex		
Male	52	39.1
Female	81	60.9
Total	**133**	**100.0**
Fasting period (in hours)		
Fasting for less than 6 hours	00	00
Fasting for 6-12 hours	34	25.6
Fasting for 12-18 hours	97	72.9
Fasting for 18 hours and above	2	1.5
Total	**133**	**100.0**
Type of surgery		
Orthopedics	42	31.6
Obstetrics	26	19.5
Gynecology	10	7.5
ENT surgery	19	14.3
Laparotomy	18	13.5
Breast surgery	10	7.5
Skin/plastic surgery	8	6.0
Total	**133**	**100.0**
Duration of operation procedure		
60-90 min	35	26.3
90-120 min	67	50.4
120-150min	28	21.1
>150 Min	3	2.3
Total	133	100.0
Comorbidity		
No	98	73.7
Yes	35	26.3
Total	**133**	**100**

4.2 HYDRATION STATUS BEFORE AND AFTER SURGERY

Table 3 shows the proportion of hydration status before and after surgery. The results show that 108 (81.2%), and 71(53%) are in class A of hydration status before and after surgery respectively, while 25 (18.8%), and 62(46.6%) are in class B before and after surgery respectively.

Table 3: Hydration status before and after surgery in elective major surgeries patients

Hydration status before surgery	**Frequency**	**Percentage**
A	108	81.2
B	25	18.8
Total	**133**	**100**
Hydration status after surgery	**Frequency**	**Percentage**
A	71	53.4
B	62	46.6
Total	**133**	**100**

4.3 TYPES AND AMOUNT OF FLUID ADMINISTERED TO THE PATIENTS DURING SURGERY

Table 4 shows the proportion of amount of fluid administered to the patients during surgery most administered fluid was RL and NS 90(67.7%). NS or RL 25 was used on a percentage of 18. NS/RL and dextrose, NS/ RL Blood products were the last administered as they used by 6(4.5%) and 12(9%) respectively.

Table 4: Types and amount of fluids administered to patients during surgery

Variables	Frequency	percentage
Type of fluids received		
RL and NS	90	67.7
NS or RL	25	18.8
NS/ RL + Dextrose	6	4.5
NS/ RL Blood products	12	9.0
Total	**133**	**100.0**
Amount of fluid received		
1000-2000 milliliters	90	67.7
2001-3000 milliliters	29	21.8
> 3000 milliliters	14	10.5
Total	133	100.0
Amount of fluid lost		
<100 milliliters	40	30.1
100-300 milliliters	49	36.8
>300 milliliters	44	33.1
Total	133	100.0

4.4 BIVARIATE ANALYSIS FOR ASSOCIATION BETWEEN PARTICIPANT'S CHARACTERISTICS, FLUID ADMINISTERED AND HYDRATION STATUS BEFORE AND AFTER SURGERY

Table 5 shows the analysis for association between participant's characteristics, fluid administered and hydration status before and after surgery where Age, and types of fluid received showed a significant association with hydration before surgery (11%) (P-value: 0.001<0.05). Comorbidity and types of surgery also showed some association with hydration status of perioperative patients. In hydration status class A it was 85 (86.7%) for non co-morbidity and class B was 13 (13.3%) with P-values of 0.006< 0.05, and 0.034< 0.05 respectively. Sex, infection and fasting period did not show any association with hydration status. The amount of fluid received during surgery was associated with hydration status. Between 1000-2000 milliliters hydration status class A was79 (87.8%) and 11(12.2%) for class B for 2001-3000 milliliters the hydration status class A was 23(79.3%) and 6(20.7%) for class B. About > 3000 milliliters the hydration status class A was 6(42.9%) and class B it was 8(57.1%) with P-value of 0.001.

Table 5: Association between client characteristics, fluids used /administered and hydration status before surgery

	Hydration status before surgery		Total	Chi square	P-value
	A	B			
Age (in years)	**n(%)**	**n(%)**	**N(%)**		
<20	10(90.9)	1(9.1)	11(100)		
21-40	56(93.3)	4(6.7)	60(100)		
41-60	31(81.6)	7(18.4)	38(100)	**21,13**	**0.000***
> 60	11(45.8)	13(54.2)	24(100)		
Total	108(81.2)	25(18.8)	133(100)		
Sex					
Male	44(84.6)	8(15.4)	52(100)		
Female	64(79.0)	17(21.0)	81(100)	**0.65**	**0.420***
Total	108(81.2)	25(18.8)	133(100)		
Comorbidity					
No	85(86.7)	13(13.3)	98(100)		
Yes	23(65.7)	12(34.3)	35(100)	**7.46**	**0.006***
Total	108(81.2)	25(18.8)	133(100)		
Infection			Total		
No	102(82.3)	22(17.7)	124(100)		
Yes	6(66.7)	3(33.3)	9(100)	**1.33**	**0.248**
Total	108(81.2)	25(18.8)	133(100)		
Type of surgery					
Orthopedics	34(81.0)	8(19.0)	42(100)		
Obstetrics	23(88.5)	3(11.5)	26(100)		
Gynecology	7(70.0)	3(30.0)	10(100)		
ENT surgery	18(94.7)	1(5.3)	19(100)	**13.62**	**0.034***
Laparotomy	10(55.6)	8(44.4)	18(100)		
Breast surgery	8(80.0)	2(20.0)	10(100)		
Skin/plastic surgery	8(100.0)	0(0.0)	8(100)		
Total	108(81.2)	25(18.8)	133(100)		
Fasting period			Total		
Fasting for 6-12 hours	30(88.2)	4(11.8)	34(100)		
Fasting for 12-18 hours	76(78.4)	21(21.6)	97(100)	**2.08**	**0.353**
Fasting for 18 hours and above	2(100.0)	0(0.0)	2(100)		
Total	108(81.2)	25(18.8)	133(100)		
Type of fluids received					
RL and NS	77(85.6)	13(14.4)	90((100)		
NS or RL	23(92.0)	2(8.0)	25(100)		
NS/ RL + Dextrose	3(50.0)	3(50.0)	6(100)	**19.14**	**0.00****
NS/ RL Blood products	5(41.7)	7(58.3)	12(100)		
Total	108(81.2)	25(18.8)	133(100)		
Amount of fluid received					
1000-2000 milliliters	79(87.8)	11(12.2)	90(100)		

2001-3000 milliliters	23(79.3)	6(20.7)	29(100)	**16.11**	**0.001**
> 3000 milliliters	6(42.9)	8(57.1)	14(100)		
Total	108(81.2)	25(18.8)	133(100)		
Amount of fluid lost			Total		
<100 milliliters	35(87.5)	5(12.5)	40(100)		
100-300 milliliters	40(81.6)	9(18.4)	49(100)	**2.15**	**0.341**
>300 milliliters	33(75.0)	11(25.0)	44(100)		
Total	108(81.2)	25(18.8)	133(100)		

Table 6 shows the Association between client characteristics, fluids administered and hydration status after surgery. In this study, the types of surgery showed a statistically significant association with hydration of the patient after undergoing operation, P-value: 0.001. Duration of surgery and types of fluid received have some linkage with hydration after surgery, P-values: 0.030, and 0.026 respectively. Other variables including age, sex, comorbidity, infection have no association with hydration after surgery. P-values> 0.05 at 95 CI.

Table 6: Association between client characteristics, fluids administered and hydration status after surgery

	A	B	Total	Chi square	P-value
Age (in years)	**n(%)**	**n(%)**	**N(%)**		
<20 years	4(36.4)	7(63.6)	11(100)		
21-40 years	37(61.7)	23(38.3)	60(100)		
41-60 years	21(55.3)	17(44.7)	38(100)	**5.42**	**0.143**
> 60 years	9(37.5)	15(62.5)	24(100)		
Total	71(53.4)	62(46.6)	133(100)		
Sex					
Male	25(48.1)	27(51.9)	52(100)		
Female	46(56.8)	35(43.2)	81(100)	**0.96**	**0.326**
Total	71(53.4)	62(46.6)	133(100)		
Co morbidity					
No	57(58.2)	41(41.8)	98(100)		
Yes	14(40.0)	21(60.0)	35(100)	**3.42**	**0.064**
Total	71(53.4)	62(46.6)	133(100)		
Infection					
No	64(51.6)	60(48.4)	124(100)		
Yes	7(77.8)	2(22.2)	9(100)	**2.31**	**0.129***
Total	71(53.4)	62(46.6)	133(100)		
Type of surgery					
Orthopedics	16(38.1)	26(61.9)	42(100)		
Obstetrics	21(80.8)	5(19.2)	26(100)		
Gynecology	1(10.0)	9(90.0)	10(100)		
ENT surgery	16(84.2)	3(15.8)	19(100)	**27.26**	**0.001***
Laparotomy	8(44.4)	10(55.6)	18(100)		
Breast surgery	5(50.0)	5(50.0)	10(100)		
Skin/plastic surgery	4(50.0)	4(50.0)	8(100)		
Total	71(53.4)	62(46.6)	133(100)		
Duration of surgery					
<=2 hours	57(62.0)	35(38.0)	92(100)		
> 2 hours	14(34.1)	27(65.9)	41(100)	**7.69**	**0.030***
Total	71(53.4)	62(46.6)	133(100)		
Type of fluids received					
RL and NS	46(51.1)	44(48.9)	90(100)		
NS or RL	19(76.0)	6(24.0)	25(100)		
NS/ RL + Dextrose	1(16.7)	5(83.3)	6(100)	**9.24**	**0.026***
NS/ RL Blood products	5(41.7)	7(58.3)	12(100)		
Total	71(53.4)	62(46.6)	133(100)		
Amount of fluid received					
1000-2000 milliliters	49(54.4)	41(45.6)	90(100)		
2001-3000 milliliters	14(48.3)	15(51.7)	29(100)	**0.42**	**0.809**

> 3000 milliliters	8(57.1)	6(42.9)	14(100)		
Total	71(53.4)	62(46.6)	133(100)		
Amount of fluid lost					
Amount of fluid loss					
<100 milliliters	27(67.5)	13(32.5)	40(100)		
100-300 milliliters	25(51.0)	24(49.0)	49(100)	**5.15**	**0.076**
>300 milliliters	19(43.2)	25(56.8)	44(100)		
Total	71(53.4)	62(46.6)	133(100)		

CHAPTER FIVE: DISCUSSION

The aim of this section is to discuss results from this study according the study objectives. The results were compared with the literature reviews of studies conducted by other researchers to exchange opinions of authors on the set objectives. The purpose of this study is to assess the perioperative fluid management in elective major surgeries before and after surgery at Butare University Teaching Hospital. This study contributes to the improvement of practice in management of fluids in perioperative periods.

5.1 SOCIODEMOGRAPHIC AND CLINICAL INFORMATION OF PARTICIPANTS

In our study, the prevalence of operated patients find to be high in female because of obstetric and gynecologic procedures. At Butare University Teaching hospital, the procedure more dominant are orthopedic surgeries because this is one hospital in South and West provinces which done those procedures. All patients with orthopedic problem in those provinces should be transferred at this hospital. We founded that Participants underwent different surgeries including 42 (31.6%) who underwent orthopedic surgery, followed by obstetrics 26(19.5%) and gynecology 10(19.5%), 19(14.3%) ENT surgeries and 18 (13.5%) laparotomy. Skin/plastic surgery was in a small proportion of 6%. Prolonged operative time, particularly with an open abdominal cavity, may eventually lead to increased bowel edema and sequestration of fluid. However, during short, less invasive procedures there is minimal evaporative or insensible fluid loss from exposed body cavities or wounds (<1 mL/kg per hour) (Khan, Siddiqui, & Asghar, 2018)

According to the WHO Hydration status classification, and clinical information of participants, the result of this study showed that patients were classified in category A and B of hydration classification before and after surgery. Of the study sample, the results show that 108 (81.2%), and 71(53%) are in class A of hydration status before and after surgery respectively, while 25 (18.8%), and 62(46.6%) are in class B before and after surgery respectively. The reason for being dehydrated after surgery was established to be due to long period of fasting before patients came to theatre and exacerbated by the time patient passed in surgical procedure and anesthesia.

While WHO recommends 6-4-2 hours (WHO, 2016) ,In this study fasting for 12-18 hours was predominant (72.9%) and the main cause of Dehydration before surgery was addition to co morbidity conditions(26.3%) and the prolonged duration of surgery, all aggravated dehydration status of patients after surgery.

In Contrast, the study done by Marsh and Brown showed that Preoperative fasting overnight for approximately 10 hours does not significantly reduce intravascular volume. Nevertheless, preoperative dehydration should be avoided by limiting the period of fasting , and encouraging patients to consume clear oral liquids up to two hours before surgery (Marsh and Brown, 2014).

5.2 HYDRATION STATUS BEFORE AND AFTER SURGERY

In our study, age and types of fluid received showed a significant association with hydration before surgery (P-value: 0.001<0.05). Comorbidity and types of surgery also showed some association with hydration status of perioperative patients with P-values of 0.006< 0.05, and 0.034< 0.05 respectively. Sex, infection and fasting period did not show any association with hydration. Lack of standard criteria for fluid therapy results in significant clinical variability relative to the type and volume of fluid administered.

There is another similar study done on perioperative fluid management regarding the association of hydration status and fasting time. They reported that preoperative fasting is mandatory, most of patients scheduled for major abdominal surgery can have clear fluids and/or administration of carbohydrate-rich drinks up to 2 hours before surgery; this will be helpful to patients as it reduce the fluid requirement to replace fluid deficits and dehydration from the time of fasting period and improve the patient outcome after surgery (Patel et al., 2018)

All this time of procedure the anesthesia tend to be a cause of increased dehydrated patient before leaving recovery room. Other important cause of being dehydrated before surgery may be the ignorance of patient and poor preparation before surgery where in this phase patient should get enough information including fasting period. Mechanical bowel preparation may be associated with fluid loss from the gastrointestinal tract, which may reduce preoperative intravascular volume. The patients also may meet a problem of poverty where they are not able to find enough food in their families.

5.3 TYPES AND AMOUNT OF FLUID ADMINISTERED TO THE PATIENTS DURING SURGERY

The proper administration of fluids though GDT during the intraoperative period is a very important aspect of individualized plans for fluid and hemodynamic management. Perioperative fluid management, however, should also include the preoperative and postoperative periods, given the added benefit of being able to provide PO hydration at those times. When the option is available, PO hydration is preferable to IV. hydration.

Preoperative hydration with complex carbohydrate drinks has been linked to multiple benefits, including a reduction in postoperative insulin resistance, improved metabolic state, decreased hospital LOS, and reduced nausea and vomiting (Garrioch & Gillies, 2015).

In our study, the most administered fluid was RL and NS 90(67.7%), and NS or RL 25(18.8%). NS/RL and dextrose, NS/ RL Blood products were the least administered as they used by 6(4.5%) and 12(9%) respectively. Perioperative morbidity is linked to the amount of intravenous fluid administered with both insufficient and, more commonly, excess fluid delivery leading to increased postoperative complications conducted randomized study that included 172 major surgeries patients and showed that fluid management was associated with a lower risk of dehydration (62 vs. 82%, $P < 0.04$). Another study, which included 1280 consecutive patients, underwent major surgeries, observed the increased dehydration and length of hospital stay in patients with intraoperative low volume.

Although, most studies found that a low fluid balance was a risk factor, in patients with acute respiratory distress syndrome and septic shock and higher initial intravenous fluid volumes followed by the low fluid balance for 2 consecutive days within the first 7 days of shock resulted in a higher mortality rate. Because of that, it is more important to focus on timing and the precise volume of fluid administration based on targets for correcting hypovolemia (Kayilioglu et al., 2015).

Contradictory study has shown that the absolute amount of perioperative fluid administered may not be a major determinant of perioperative outcomes ((Helena et al., 2015).

We found that the administration of dextrose is only done when patient had a bleeding during procedure and the transfusion of blood product is done according to the hemoglobin of patient before surgery.

Infusion of 4 ml/kg/h compared to 12 ml/kg/h of lactated Ringer's solution as maintenance fluid during GDT with Dextrose reduced the incidence of major complications by 50%. Administration of large amount of crystalloids during prolonged surgery results in weight increase 3–6 kg. Positive fluid balance has been associated with more complications and increased mortality in surgical patients(Haydock et al., 2013).

The choice of fluids is largely based on traditional beliefs, context of practice, and cost. For example, in comparing the use of colloid to crystalloid for treating hypovolemia, clinicians from the UK, China, and Australia rely primarily on colloid therapy (55% to 75% of time),

whereas only 13% of clinicians in the US use colloid for treating hypovolemia (Navarro *et al.*, 2015).

Results of clinical trials comparing fluid resuscitation with colloids and crystalloids in different populations have been conflicting. Most recently, as highlighted in clinical trials and meta-analyses, the safety of using specific colloids for fluid resuscitation has been questioned (Helena et al., 2015).

Nisanevich et al. compared 4 ml/kg/h with 12 ml/kg/h of fluid maintenance during gastrointestinal surgery and reported significant decrease in postoperative morbidity (Nisanevich et al., 2017). In another study, fluid administration of a median of 3000 ml compared to 6300 ml, reduced complications and length of hospital stay after colorectal surgery (Voldby & Brandstrup, 2016).

5.4 ASSOCIATION BETWEEN CLIENT CHARACTERISTICS, FLUIDS USED/ ADMINISTERED AND HYDRATION STATUS BEFORE AND AFTER SURGERY

Maintaining proper hydration without fluid overload in the intraoperative period is just as important as maintaining proper fluid management in the postoperative period (Makaryus, Miller, & Gan, 2018). In this study, the types of surgery, duration of surgery and types of fluid received showed a statistically significant association with hydration of the patient after undergoing operation. Therefore, no study found which showed the association between type of surgery and hydration status.

Our study assessed the dehydration status in perioperative period but is not focused on other complication related to fluid therapy. However, a study done in USA found out that the most common cause of perioperative hypervolemia is retention of fluid administered during surgery.

Clinically significant postoperative fluid retention has been associated with increased morbidity, length of stay in the intensive care unit, and mortality. In critically ill surgical patients, this association may be spurious since fluid may be administered to treat hemodynamic instability (from increased vascular permeability) or bleeding, factors that are independently associated with poor outcome. However, tissue edema has independent deleterious effects on various organ systems, even in patients who remain thermodynamically stable (Puxty, K. 2018).

Another meta-analysis of randomized trials in more than 3700 unselected critically ill or perioperative adult patients did not find a significant reduction in mortality (odds ratio [OR] 0.90, 95% CI 0.69-1.17) or incidence of RRT (OR 1.12, 95% CI 0.80-1.58) with administration of balanced electrolyte solutions rather than NS; however, most of these patients received a low fluid volume(Bennett and Cecconi, 2017)

In our study, the type of fluids administered mainly to patients undergoing elective surgery is normal saline. This is contrary study revealed that some clinicians prefer to use colloids in selected patients or situations in attempts to expand micro vascular volume with minimal capillary leakage, thereby minimizing oedema formation and the total quantity of administered fluid. For example, during blood loss, colloids may be administered on a 1.0:1.0 volume basis until a transfusion threshold is met (Puxty, K. 2018).

In most studies, restrictive fluid therapy has been associated with better outcomes than traditional liberal or fixed-volume approaches for major elective surgical procedures. However, variability in study design has resulted in inconsistent results.

In 2016 a meta-analysis found that standard or liberal approaches to fluid therapy in patients undergoing major abdominal procedures resulted in a higher risk for pneumonia and pulmonary edema, as well as longer hospital stay, compared with a restrictive approach to fluid therapy. In a subsequently published randomized trial of 3000 patients undergoing major abdominal surgery, a restrictive fluid regimen was associated with a higher rate of acute kidney injury (AKI) compared with a liberal fluid regimen. The total fluid volume administered during and up to 24 hours after surgery was 3.7 versus 6.1 L in the restrictive and liberal groups, respectively (Asghar, M. 2018) .

Bundagaard-Neilson *et al*. did a critical assessment of the available evidence comparing liberal versus restrictive perioperative fluid therapy and postoperative outcome, and they concluded that there is no proper definition for any type of fluid therapy, and three of the trials showed improved outcome after restrictive fluid regimes; two showed no difference in the outcome. Moreover, in the past, efforts to restrict fluids have led to problems of oliguria, anuria, and acute renal failure . Hence there is still no clear agreement as to whether the perioperative patient should be managed using a liberal or restricted fluid approach.(Kingdom, Confidential and Deaths, 2018).

CHAPTER SIX: RECOMMENDATION AND CONCLUSIONS

6.1 INTRODUCTION

Perioperative fluid management impacts and improved positive outcomes and plays a pivotal role in enhanced recovery pathways (ERPs). There have been major advances in understanding the effects of fluid therapy and administration during the perioperative period. Improving fluid management during this period leads to a decrease in complications, decrease in length of stay (LOS), and enhanced patient outcomes.

6.2 CONCLUSION

Fluid management is critically important during the perioperative period. The most important goal is to maintain hemodynamic stability and protect vital organs from hypo perfusion (heart, liver, brain, kidneys). All fluid losses must be accounted for. Good fluid management goes a long way toward preventing problems.

As this study was conducted at BUTH, after assessing the hydration status of patient before surgery and after surgery before leaving PACU, this study revealed that many patients are dehydrated and are classified in class B after surgery and this was caused by having comorbidities, age and types of fluids received .

We founded that there is a gap in estimation of fluid loss during surgery where they estimated small quantity which cause the inadequate administration of fluids.

There is association between client characteristics, fluids used/administered and hydration status. We founded that patients with advanced ages, most of them were in class B of hydration status.

6.3 RECOMMENDATION

The following are recommendations specific to the findings from the study. The findings from this study are addressed to the Butare University teaching hospital that there is a need of effective of perioperative fluid management in operating theatre and surgical ward where they prepare patients for surgery and to allocate nurses specialist in perioperative for better management of fluid in patients undergo surgery.

The results of this study are addressed to the Butare University Teaching Hospital staff nurses and anesthetists that they need to individualized patients fluid needs assessment and therapy during surgery to optimize hydration status and patient's surgical outcomes.

Strict monitoring of fluid administration regime to surgical patients in the preoperative, intraoperative and postoperative periods then to give IV fluid as part of protocol.

Refresher courses on fluid therapy during surgery updates for nurses and anesthetists

Further studies using larger samples to help develop general guidelines for fluid therapy during surgery.

Respect the WHO surgical fasting guidelines (6-4-2 rules) to prevent preoperative dehydration.

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1. RESEARCH INSTRUMENTS

CHEKLIST

SECTION A: INDIVIDUAL CHARACTERISTICS

1. Age----------years
2. Sex
    a. 0. Male
    b. 1.Female
3. Weight……..Kgs

4. Fasting period: …….hours
5. Comorbidity
    a. 0. No
    b. 1. Yes
6. Any infection present?
    a. 0. No
    b. 1. Yes
7. **Type of surgery**
    a. ENT surgery
    b. Skin/ plastic surgeries
    c. Orthopedics
    d. Laparotomy
    e. Gynecology
    f. Obstetrics
    g. Breast surgery,
8. Duration of the operation(surgery)……..hours

SECTION B. ASSESSMENT OF HYDRATION STATUS BEFORE AND AFTER SURGERY

9. **Hydration status before Surgery**
    a. **1. A**
    b. **2. B**
    c. **3. C**

DEHYDRATION CLASS	**A**	**B**	**C**
Mental status :	Alert	Fatigued, Restless, irritable	Apathetic, Lethargic, comatose
Thirst:	Normal, slight increase, or rufusing	Thirsty Increased, eager to drink,	Very thirsty, Unable to drink
Heart rate;	Normal	Normal to increased	Tachycardic with bradycardia ,
Blood Pressure	Normal	Normal	Normal to reduced
Pulse quality	Normal	Normal to reduced	Weak, thread
Respiratory:	Normal	Rate	Increase rate and volume
Skin turgor	Instant recoil	Recoil in < 2 seconds	Recoil in >2 seconds
Capillary refill	Normal	Prolonged 1-2 seconds	Prolonged >2 seconds
Eyes	Normal	Slightly sunken orbits	Deeply sunken orbits
Tears	Present	Decreased	Absent
Extremities:	Normal	Cool	Cold, mottled
Mucous membranes:	Moist	Dry	Parched
Skin fold:	Immediate recoil	Delayed (>2 s)	>2 s
Urine output:	**Normal**	Diminished	Absent

10. Type of fluids received

1. NS or RL
2. RL and NS
3. NS/ RL+ hoemacel
4. Haemacel/Gelo
5. NS/RL+ Blood products
6. NS/RL + Dextrose
7. Per os fluids
8. Others, specify……..

11. Amount of fluids received…….ml

12. Amount of Intraoperative fluid loss ……...ml

13. Hydration status before patient leave PACU

1. **A**
2. **B**
3. **C**

DEHYDRATION CLASS	A	B	C
Mental status :	Alert	Fatigued, Restless, irritable	Apathetic, Lethargic, comatose
Thirst:	Normal, slight increase, or rufusing	Thirsty Increased, eager to drink,	Very thirsty, Unable to drink
Heart rate;	Normal	Normal to increased	Tachycardic with bradycardia ,
Blood Pressure	Normal	Normal	Normal to reduced
Pulse quality	Normal	Normal to reduced	Weak, thread
Respiratory:	Normal	Rate	Increase rate and volume
Skin turgor	Instant recoil	Recoil in < 2 seconds	Recoil in >2 seconds
Capillary refill	Normal	Prolonged 1-2 seconds	Prolonged >2 seconds
Eyes	Normal	Slightly sunken orbits	Deeply sunken orbits
Tears	Present	Decreased	Absent
Extremities:	Normal	Cool	Cold, mottled
Mucous membranes:	Moist	Dry	Parched
Skin fold:	Immediate recoil	Delayed (>2 s)	>2 s
Urine output:	**Normal**	Diminished	Absent

----------End----------

2. CONSENT FORM

Chairperson of the CMHS IRB (**0788 490 522**)

Deputy Chairperson (**0783 340 040**)

Number: … /2018

My name is IRAFASHA Peter, In order to improve the quality of nursing practice of perioperative fluids management, a Master student from the University of Rwanda, College of Medicine and Health Sciences, Master's program, is conducting a research on Nursing practice of perioperative fluids management in major surgery at university teaching hospitals, Rwanda

The main purpose of this study is to assess the nursing practice of peri-operative fluid management in major surgery at University Teaching Hospitals, Rwanda.

For this purpose, I humbly request you to participate in this study by completing this questionnaire which will take you about 10 minutes.

All of the answers you give will be confidential and will not be shared with anyone other than the researcher and my supervisors.

You have right to participate in the study or not and you have right to withdraw at any stage.

Do you have any questions/ clarifications?

I thanks to you in advance for your kind and precious participation

I agree to participate in the research: Yes ☐ No ☐

Signature of participant:…… ……..date:……

INYANDIKO Y'UWEMEYE GUFASHA MU BUSHAKASHATSI

Umuyobozi wa CMHS IRB (**0788 490 522**)

Umuyobozi wungirije (**0783 340 040**)

Turabasuhuje,

Nitwa IRAFASHA Peter, Mu rwego rwo twarushaho gutunganya imikorere mu gutanga serumu mu gihe cyo kuvura babaga, umunyeshuli wiga mu cyiciro cya gatatu cya kaminuza mu bijyanye no kuvura imbagwa muri Kaminuza y' u Rwanda, ari gukora ubushakashatsi mu baforomo bakorera mu ibagiro.

Ubushakashatsi bufatiye ku kumenya uburyo abaforomo bakoresha seumu mu gihe cyo kuvura babaga umurwayi mu bitaro bikuru mu Rwanda.

Kubw'iyo mpamvu, turifuza ko mwadufasha gusubiza ibibazo twateguye mu rwego rw'ubushakashatsi.

Gusubiza ibyo bibazo bifata iminota icumi.

Ibisubizo bigirwa ibanga (bibonwa n'umushakashatsi gusa n'abamuyoboye).

Gusubiza ni ubushake, kandi wahagarika ubufatanye mu bushakashatsi igihe cyose ubishakiye.

Hari ikibazo ufite?

Mbaye mbashimiye ubufatanye mungaragariza muri iki gikorwa.

Uremera gusubiza ibibibazo ntagahato?

Yego ☐

Oya ☐

Umukono w'ubazwa…… Itariki……