Fluid management pattern among post laparotomy patients at Muhimbili National Hospital, Dar Es Salaam Tanzania

JAMES C. ZAKARIA, MD

MMed (General surgery) Dissertation
Muhimbili University of Health Allied Sciences
October, 2019

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCE (MUHAS)

DEPARTMENT OF SURGERY

FLUID MANAGEMENT PATTERN AMONG POST LAPAROTOMY PATIENTS AT MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM TANZANIA

By,

JAMES C. ZAKARIA

A Dissertation Submitted in (Partial) Fulfilment of the Requirements for the Degree of Master of Medicine (General Surgery) of

Muhimbili University of Health and Allied Sciences

October, 2019

CERTIFICATION

The undersigned certifies that he has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled, **Fluid management pattern among post laparotomy patients at MNH, Dar es Salaam tanzania**, in (partial) fulfilment of the requirements for the degree of Master of Medicine (General Surgery) of Muhimbili University of Health and Allied Sciences

_____

Dr. Larry Akoko

Supervisor

_____

Date

DECLARATION AND COPYRIGHT

I, **Dr. James C. Zakaria,** declare that this dissertation is my original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

Signature …… Date……...

This dissertation is a copyright material protected under the Berne Convention, the Copyright Act 1999 and other international and national enactments, in that behalf, on intellectual property. It may not be reproduced by any means, in full or in part, except for short extracts in fair dealing, for research or private study, critical scholarly review or discourse with an acknowledgement, without written permission of the Directorate of Postgraduate Studies, on behalf of both the author and the Muhimbili University of Health and Allie Sciences.

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to My Almighty God for giving me a privilege to live and encompass me with love strength and ability to accomplish this project.

To my dearly wife and blessed daughter who endured with love on my absence during this project.

To my late parents, Clement Z. Nyanda and Deodatha P. Msafiri with their love and guidance has made me to stand till these hours, may their soul rest in peace.

To my lovely guardian Mr & Mrs Patrick Fata and my In-laws you have always been by my side encouraging, wishes, and support during this period.

To community, KLPT-city parish, Managing Director TMJ Hospital LTD Dr Jaffar T.M, my fellow residents your trust, companion and everlasting love will always be a manifesto in my life.

I'm so grateful and honoured to be mentored and supervised by Dr Larry Akoko who had devoted his time and knowledge towards my carrier. His ever support will forever cherish in my life.

To Dr Emmanuel Balandya, Dr Elizabeth Ngonyani, Ms Rebecca Chaula you have always shown your deep concern in the progress of this study and the ideas you have provided contributed significantly in shaping this dissertation.

Lastly I would also like to express my sincere heart to all management of MNH for assisting and allowing me to conduct my study in their prestige hospital in the country.

DEDICATION

To

All heartbroken children with hope to life.

ABSTRACT

Background: Fluid management to post-operative patient have remained a challenge tomany health facilities especially in Africa and the world at large, the right amount and type of fluid has remained uncertain to many institutions.

Methodology;A total of two hundred and eighty eight patients who under-went laparotomy between July, 2017 to January 2018 at MNH were studied prospectively in **a**descriptive hospital-based cross-sectional study where the patterns of their fluid management was studied and analysed using Chi-square as per managing physician/surgeon where input/output and hydration status were recorded in general surgical ward at MNH.

Results: Results has shown that, there is adifference among the type and amount in relation to fluid prescribed by surgeon andthe fluid received by patient in the ward. Colonic surgery was among the mostcommon operation done, the average weight of the patientswas 64kg with average of 2781mls of fluid prescribed and 2054mls were received. The male female ratio was 1:1; elective cases were more compared to emergency cases.

Dextrose saline with ringer lactate was preferred combined fluid given to patients and dextrose saline no in combined form. 87% of patients were well hydrated and 7 patients were hyponatremic and 31 patients were hypernatremic.

Conclusion and recommendation: Physiological factor should be considered in determining type and amount of fluid to be given and other factors such as sex, age, weight, renal status, electrolyte status. There is need for establishment of functional protocol on fluid management and patients be managed as per physician.

Table of Contents

CERTIFICATION i
DECLARATION AND COPYRIGHT ii
DEDICATION iv
ABSTRACT v
LIST OF TABLES viii
LIST OF FIGURES ix
LIST OF ABBREAVIATIONS x
CHAPTER ONE 1
1.0 INTRODUCTION 1
1.1 .0BACKGROUND 1
1.2 LITERATURE REVIEW 2
CHAPTER TWO 5
2.1. STATEMENT OF PROBLEM 5
CHAPTER THREE 6
3.0 RATIONALE 6
CHAPTER FOUR 7
4.0 RESEARCH QUESTIONS AND HYPOTHESIS 7
4.1 Research question 7
4.2 Hypothesis 7
CHAPTER FIVE 8
CHAPTER SIX 9
6.0 METHODOLOGY 9
6.1 Study design 9
6.3 Study population 9
6.4 Sampling method and sample size 9
6.4.1 Sampling method 9
6.4.2 Sample size 10
6.5 Inclusion and exclusion criteria 11

6.5.1 Inclusion criteria 11
6.5.2 Exclusion criteria 11
6.6 Data collection tools 11
6.7 Data collection method 11
6.8 Data analysis 12
6.9 Ethical considerations 12
CHAPTER SEVEN 13
7.0 RESULTS 13
CHAPTER EIGHT 16
8.0 DISCUSSION 16
CHAPTER NINE 18
9.0 CONCLUSION AND RECOMMENDATION 18
9.1 CONCLUSSION 18
9.2 RECOMMENDATION 18
10.0 REFERENCE 19
APPENDICES 22
APPENDIX No 1-UK National guideline on Post-Operative Intravenous Fluid 22
APPENDIX No. 2 - Informed Consent Form (English Version) 23
KIAMBATANISHO Na. 3 – Fomuya Ridhaa (Swahili Version) 26

LIST OF TABLES

Table 1: The distribution of age, sex, types of surgery done, procedure site, mean fluid and average weight of the patients' undergoing laparotomy at.....13
Table 2: Distribution of amount of fluid in relation to hydration status and serum sodium level 15

LIST OF FIGURES

Figure 1: The distribution of combination of fluid to number of days to the post-operative patients' under-going laparotomy at.....14
Figure 2: showing distribution of amount of fluid prescribed and received against the number of days. 14

LIST OF ABBREAVIATIONS

AFR	Acute Renal Failure
BUN	Blood Urea Nitrogen
CME	Continuous Medical Education
DIC	Disseminated Intravascular Coagulopathy
ECF	Extra Cellular Fluid
GDT	Goal Directed Therapy
ICU	Intensive Care Unit
ICF	Intra Cellular Fluid
KLPT	Kanisa la Pentekoste Tanzania
MNH	Muhimbili National Hospital
MUHAS	Muhimbili University of Health and Allied Science
NPO	Nil per Oral
TWB	Total Body Weight

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Fluid management remain one of the important tool in management of operative patients, fluid can be in the form of colloids, or crystalloid. For the purpose of our dissertation, we are going to concentrate more on crystalloid, which constitute normal saline, ringer lactate and dextrose saline and pure dextrose fluid. Crystalloid solutions contain sodium and chloride, which determine the tonicity of the fluid and are freely permeable to cells(1).

Fluid therapy can be given as resuscitation, maintenance or replacement. Resuscitation fluid is given often in emergence situation where fluid is given to a patient in order to treat shock. Maintenance fluid is given to meet daily physiological fluid requirement and replacement for fluid lost via drainages (2).

Currently fluid is given depending on type of fluids whether is colloid or crystalloid, amount administered in restrictive or liberal way, and to meet physiological requirement (goal directed [GDT] versus not goal directed) (3). This can be summarized in three principles of management of fluid balance which can correct any abnormalities and provide the daily requirements, replace any abnormal and on-going losses. This can be corrected before or during the surgical procedure, in the calculating fluid requirements distinction is to be made between the volume required to maintain the body's normal functions and that required to replace any abnormal losses. The normal maintenance fluid requirements will vary depending on the patient's age, gender, and weight and body surface area(4).

Body water constitutes 50%in female and 60% in male adult to their total body weight (TBW). The lower percentage of TBW in females correlate with a higher percentage of adipose tissue and lower percentage of muscle mass in most. Estimates of percentage of TBW should be adjusted downward approximately 10% to 20% for obese individuals and upward by 10% for malnourished individuals. The highest percentage of TBW is found in new-borns, with

approximately 80% of their total body weight is comprised of water. This decreases to approximately 65% by 1 year of age and thereafter remains constant(5).

TBW is divided into three functional fluid compartments: plasma, extra vascular interstitial fluid, and intracellular fluid. The extracellular fluids (ECF), plasma and interstitial fluid together compose about one third of the TBW, and the intracellular compartment composes the remaining two thirds. The extracellular water composes 20% of the total body weight and is divided between plasma (5% of body weight) and interstitial fluid (15% of body weight). Intracellular water makes up approximately 40% of an individual's total body weight, with the largest proportion in the skeletal muscle mass. The ECF compartment is balanced between sodium, the principal cation, and chloride and bicarbonate, the principal anions. The intracellular fluid compartment is composed primarily of the cations potassium and magnesium, and the anions phosphate and sulphate, and proteins. The concentration gradient between compartments is maintained by adenosine triphosphate–driven sodium-potassium pumps located within the cell membrane (2).

Postoperative fluid management plays a key role in providing adequate tissue perfusion, stable hemodynamic and reducing morbidities related with hemodynamic. Understanding body fluid physiology and possible outcomes of different fluid management strategies is crucial for all surgeons.

1.2 LITERATURE REVIEW

Fluid management remain one of the challenging topic**s** in African and globally at large, different modalities have been highlighted on fluid management post-operatively though more studies have been recommended to reach on conclusion.

Type and combination of fluids

Fluids can be either crystalloid or colloid; none of them has shown the beneficial effect over the other, there is more prevalence of using of crystalloids than colloid because of cost effectiveness and availability(2,6). Also fluid can further be classified depending on plasma

concentration; fluid can be isotonic, hypotonic or hypertonic which can be used depending on the need(2).

Following surgery patient should receive dextrose-water 5% with potassium as maintenance fluid, ringer lactate and normal saline should be reserved for replacement of losses. This will help in avoiding infusion of large quantity of salts, as during physiological stress such as surgery body tend to preserve salt and water via hormonal response and fluid should be tapered down as patient start to take orally while monitoring electrolyte for patient who had extended period of NPO (2,3).

Amount of fluids given

The fluid administered to the patient should be just able to serve the goal for which has been intended to be achieved. Ever since the concept of over-hydration and under-hydration came up, determining the correct amount of fluid has erupted among scientists. Giving too much fluid has been shown to result in various complications like pneumonia, delayed bowel function, renal problems, and increased hospitalisation(2–4,6–8).For these reasons, goal directed therapy has received recommendation among various clinicians as has been shown in various studies that the complications found in the liberal approach were reduced (9,10,12).

Liberal way of fluid management have been compared with restrictive way, where restrictive way is associated with early passage of flatus, bowel sound, decrease hospital stay and gastric emptying had been favoured more than liberal approach (13,14). However there other studies which had shown no differen**ce** between liberal way and restrictive way on fluid management (13,15).

Effect of Fluids Therapy

Fluids therapy has been associated with post-operative electrolyte imbalance, weight gain and oedema and these complications are seen when liberal approach had been instituted and are related with poor wound healing, impaired pulmonary activities and compromised bowel function, these are less seen in restrictive approach (6,7,16). When replacement fluids are

recommended, balanced crystalloids such as ringer's lactate/acetate or Hartmann's solution can be used to replace 0.9% saline, except when there is risk of development of hypochloraemia e.g. from vomiting or gastric drainage in order to avoid hyperchloraemic acidosis(17).

Prescription Knowledge

"Knowledge is power" when continuous audit on clinical practice with appropriate analysis have shown to improve the knowledge on fluid prescription, It hasalso shown the importance of repeated education to all cadres and establishment of local guideline on how fluid therapy should be prescribed to post-operative patient(9,18,19). This will help in changing of our practice and hence reduction of post-operative complication. Understanding different therapy and its composition will enable clinicians to determine what fluid, what amount to give in order to meet the physiological need and goals of management(8,13,17).

Hydration status

Adequate fluid therapy is pivotal key for the maintenance of metabolic status of the human being, when fluid is inadequately prescribed or over prescribed may lead to physiological derangement leading to poor outcome of the surgical procedure(20). Hydration status can be assessed by determining the hydration status of the patient where dryness of mucous membranes, temperature of extremities, pulse, BP, lung crepitations, oedema, liver tenderness, facial puffiness are used(18,21). Several studies has shown the decrease in poor outcome in relation to fluid therapy when restrictive fluid therapy instituted compared to other modalities like liberal and GDT(4,6,22).

CHAPTER TWO

2.1.STATEMENT OF PROBLEM

Proper fluid management post-operative is essential in restoring the normal physiological function of the patients by ensuring the attainment of the body physiological demands. This therefore requires that fluid management be individualised to the patient. Currently fluid management have changed from traditional way to GDT or restrictive method in prescribing fluid to post-operative patient globally, although none of the method has been approved as standard protocol.

However current practice shows that there is a risk of inappropriate fluid management at MNH where fluid is not individualised, input/output is not often considered and prescriber and nurses mismatch in fluid therapy. In a pilot study which involved 20 patients it was found that about 20% of patients were given one type of fluid, 40% were given less amount of fluid per prescription, 50% of patient hydration status were not assessed, 80% were given fluid not as per physiological need.

AtMNH, we do not have a standard protocol that guide on fluid therapy prescription to our operative patients and we are not sure of the practice of fluid therapy in our setting. Therefore, there is need to evaluate our practice.

CHAPTER THREE

3.0 RATIONALE

This study will help our institution determine the pattern of fluid prescription and effects of fluid therapy among post laparotomy patients at MNH.Insights from this study will also provide baseline information that will be used in setting fluid management guidelines and thus foster balanced fluid therapy to post-laparotomy patients at MNH. General surgical unit was chosen because it is the one of the units at MNH where more laparotomy are done and close monitoring of fluid therapy should be followed up closely.

CHAPTER FOUR

4.0 RESEARCH QUESTIONS AND HYPOTHESIS

4.1 Research question

1. Does fluid therapy prescribed meet the required fluid demand to post laparotomy patients at MNH?
2. Do patients get fluids as prescribed by surgeons' post-operatively?
3. What types of fluids are prescribedfor post-operative patients'?

4.2 Hypothesis

Fluid management at MNH meet the physiological requirements for post- operative patients.

CHAPTER FIVE

5.0 BJECTIVES

5.1 BROAD OBJECTIVE

To describe the patterns and outcome of post-operative fluids therapy given to patients undergoing laparotomy at MNH.

5.2 SPECIFIC OBJECTIVES

i. To describe the pattern of fluid prescription by clinicians at MNH.
ii. To determine the amount of fluid administered per patient at MNH.
iii. To assess the effect of fluid management in relation to electrolyte imbalance.
iv. To assess the hydration status in relation to fluid administered.

CHAPTER SIX

6.0 METHODOLOGY

6.1 Study design

The study was a hospital based descriptive cross-sectional study.

6.2 Study area

The study was carried out at MNH, which is at the apex of health delivery in the country with 55 million populationsand it serves as a teaching hospital to MUHAS which is the oldest and largest medical university in the country. With seven operating rooms, the site gives an opportunity to have access to large number of patients and level of care is expected to be backed by evidence as a teaching hospital. With its 1500 beds capacity, 128 of which are dedicated to surgical services and mixed practitioners from residents to specialist adds to suitability for study. The study was focused onin-patient admitted to ICU and general surgical wards.

6.3 Study population

All post-surgical patients whowereadmitted in general adult surgical ward and ICU at MNH during the study period.

6.4 Sampling method and sample size

6.4.1 Sampling method

All post laparotomy patients who were admitted during the study period wereincluded.Everyday new patients were serially enrolled until the sample size was reached.

6.4.2 Sample size

The estimated sample size N is computed using the formula below,

$$N = \frac{Z^2 p (100-p)}{e^2}$$

Where;

N = Estimated Minimum Sample Size

Z = is the standard deviation in normal population, which turns out to be 1.96 on using the 95% confidence interval.

P= prevalence of

e= margin of error (5%)

From a previously done study, *Effects of Intravenous Fluid Restriction on Postoperative Complications* (23) where Prevalence was 33%(6). Hence, from the formula above the sample size will be calculated as follows;

$$N = \frac{Z^2 p (100-p)}{e^2} = \frac{1.96*1.96*33(100-33)}{5*5}$$

Minimum sample size, N = 339.75

Therefore, the total number patients, which will be studied, will be approximated to 340.

6.5 Inclusion and exclusion criteria

6.5.1 Inclusion criteria

All first post-laparotomy patients admitted to general surgical adult ward and ICU done at MNH.

6.5.2 Exclusion criteria

All post-laparotomy patients whom had not givenvoluntary written informed consent.

6.6 Data collection tools

All post-laparotomy patients admitted into general surgical ward and ICU were recruited into the study whilst considering inclusion and exclusion criteria using standardized case report form developed.

6.7 Data collection method

All patient undergoing surgery had his/her weight measured their weight using bench scale before going to their operating room and post-operative when they start to ambulate.Scale was calibrated using standard weight set. All investigation and management were recorded as per managed physician or surgeon.

6.8 Data analysis

The data were analysed using Statistical Package for Social Science (SPSS) version 20 in accordance to specific objectives. Data was summarized in the form of proportions and frequency tables for categorical variables. Mean with standard deviation was used to summarize continuous variables.

A Chi-square test was performed to test for significant associations between dependent and independent variables within categorical variables. P value of < 0.05 was considered as statistically significant.

6.9 Ethical considerations

Ethical clearance to conduct the study was sought from MUHAS Research and Publication Committee. Permission to do the study was obtained from Muhimbili National Hospital management to allow provision of information necessary for the study from data base systems. Informed consent to participate in the study was sought from potential study participants during perioperative period. The participants were assured of confidentiality and measures such as use of codes instead of names will be used to ensure this. The benefits and risks to participants were clearly stated clearly in the consent form. In addition, all clients were informed that, there will be no financial gain obtained by participating in this study. Patients that refuse to participate in the study were excluded in the study and they were allowed to withdraw consent even in the mid of the study.

CHAPTER SEVEN

7.0 RESULTS

A total of 288 patients were recruited in this study, with male to female ration of 1:1. Their mean age was 49.1±15.7 (17 – 85 years) with majority falling in the age group of 40 - 60 years at 137(47.6%). Most of the patients were from elective surgery 226 (78.5%) with most common procedure being colonic surgery 157 (54.5%) followed with gastric surgery 60(20.8%), solid organ surgeries were the least 10(3.5%). The average weight was 64kg with average amount of fluid prescribed 2781mls and received 2054mls as shown in the table 1 below.

Table 1: Distribution of age, sex, types of surgery done, procedure site, mean fluid and average weight of the patients under-going laparotomy at MNH. N= 288

		N(%)
Age group (years)	<40	86 (100%)
	40-60	137 (100%)
	>60	65 (100%)
Sex	Male	142 (49.3%)
	Female	146 (50.7%)
Type of surgery	Elective	226(78.5%)
	Emergency	62(21.5%)
Procedure site	Colonic	157(54.5%)
	Gastric	60(20.8%)
	Biliary	50(17.4%)
	Diagnostic lap	11(3.8%)
	Solid organ	10(3.5%)
Mean fluid	Prescribed	2781mls
	Received	2054mls
Mean weight		64kg

Dextrose saline with ringer lactate was preferred fluid prescribed and received in a combination form by many patients with trend decreasing gradually from day one to day five. Dextrose saline were preferred fluid which was not given in combination as shown in the Figure 1 below.

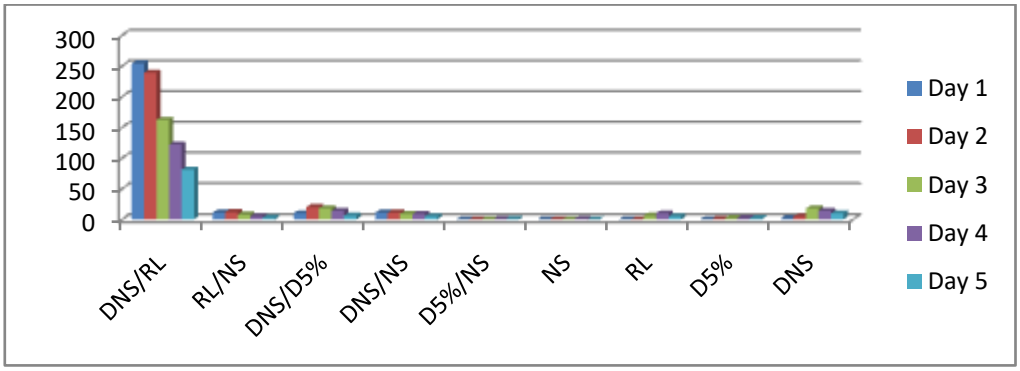


Figure 1: The distribution of combination of fluid to number of days to the post-operative patients' under-going laparotomy at MNH.N=288.

Of the 3000mls prescribed per patient day one, only 1295mls were actually given to patients. Day 2 and 3 fluids prescribed almost equalled that administered, with discrepancies between prescription and administration resuming in days 4 and 5 as can be seen from Figure 2 below.

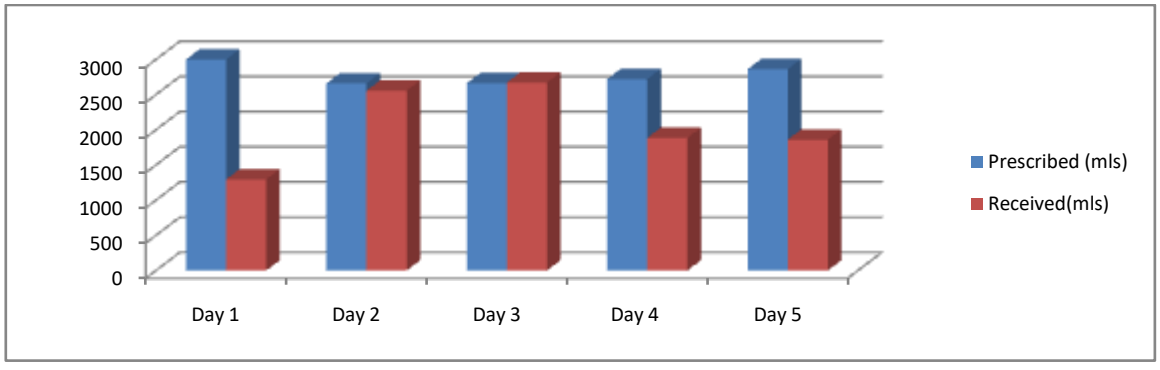


Figure 2: showing distribution of amount of fluid prescribed and received against the number of days.

Study shown most of the patient(86.8%) who received 1600mls to 2400mls were well hydrated compared to 2.4% of patient who received >2400mls of fluid whom were over-hydrated and out of 288 patient only 31(10.8%) patient were dehydrated.

Out of 288 patients recruited 207 patients their serum sodium were measured, 169 patients had normal concentration of sodium level compared to 7 patients who developed hyponatremia and 31 patients who developed hypernatremia as shown in the table 2 below.

Table 1: Distribution of amount of fluid in relation to hydration status and serum sodium level

Status	**Amount fluid(mls)**			**Total**
	<1600(%)	**1600-2400**	**>2400**	
Overhydrated	0(0%)	0(0%)	7(13%)	7 (2.4%)
Hydrated	19(38.8%)	184(99.5%)	47(87%)	250 (86.8%)
Dehydrated	30(61.2%)	1(0.5%)	0(0%)	31 (10.8%)
				288 (100%)
Hyponatremia	0(0%)	0(0%)	7(14.6%)	7 (3.4%)
Normonatremia	12(28.6%)	116(99.1%)	41(85.4%)	169 (81.6%)
Hypernatremia	30(71.4%)	1(0.9%)	0(0%)	31 (15.0%)
				207 (100%)

NB;Clinical assessment of volume/fluid/hydration status such as dryness of mucous membranes, temperature of extremities, pulse, BP, lung crepitations, edema, liver tenderness, facial puffiness

CHAPTER EIGHT

8.0 DISCUSSION

Post laparotomy patient should be given maintenance fluid and replacement or redistribution fluid whenever there is need to do so. The choice of fluid to be given will be determined by the plan of the management as fluid management plays a pivotal role for postoperative care: in our study we have observed that this was notclearly stated. In our study, we have observed the use of DNS and RL as preferred fluid used to post-operative laparotomy patients. Surgery being trauma results in body response through stimulation RAAS which activates salt preservation(12,21,22). The use of DNS would also result in excess of salt and this would result in more fluid retention which might have consequences related to overload. If fluid prescription would follow serum electrolytes determination, then NS and RL would only be given for therapeutics aims to correct deficits noted and should never be used for maintenance purposes like in the post-operative periods. It has been suggested that fluid low in sodium is the most ideal for the peri-operative patients as has been suggested by NICE guidelines(25).

Patient who underwent laparotomy at MNH received liberal fluid regime where their amount of fluid given was corresponding to their weight. A lot of studies favour liberal regime to maintain optimum fluid balance which is necessary in maintaining normal physiological state of the patient (16,21). However, restrictive regime has been shown to have several advantages over liberal regime like reductions in: hospital stay, pulmonary congestion and gastrointestinal function (21). At MNH, restrictive fluid regimen is only known by thoracic surgeons hence is not widely practiced. Adopting the liberal approach uniformly will allow further research in this topic of fluid administration with possibility of randomization to study superiority of one approach over the other.

Most of the laparotomy seen in the study were elective nature with average weight of 64kg:meaning 2380mls was required as maintenance fluid according to Holiday and Segar(26).To the contrary, 3000mls was prescribed with only 2054mls being administered by nurses according to the monitoring charts. This means that there was a deficit of 326mls of the

mean fluid required and 946mls of the prescribed fluid. The amount of fluid received by patients was less compared another study where 2500mls and 1500mls of isotonic fluid was used as standard and restrictive amounts for post-operative patient respectively (27).Whether the nurses had different knowledge or end points for monitoring different from physicians is unknown. This is another area of study since physicians only prescribe and nurses administer and monitor the patients. The nurses need to understand fluid prescription and monitoring just like the doctors to avoid under or over prescription.

Most of the patient in our study were well hydrated, this is because the amount of fluid which given 2054mls was sufficient to cover the daily amount fluid required. Most of the patients resume their oral feeding within the day three of after surgery, and we have observed 81.6% were having normal level of sodium after surgery. Sodium level was studied in this study as it has direct effect to the amount of water/fluid in the body, other electrolyte studied were chloride and potassium. Hypernatremia can be treated by giving free water (dextrose 5%) which was available at MNH. Hyponatremia can be treated by giving hypertonic solution such as 3% saline which was also available in the study area. Out of 288 patient recruited in the study 31 patient developed hypernatremia and 7 patients developed Hyponatremia which were fluid related. Other studies have shown fluid management has direct link with formation of edema when large volume of fluid was instituted (6,7).

Lastly, fluid management in the post-operative patients did not seem to consider replacement as volumes prescribed and administered were nearly those that were required for maintenance purposes. This would result into complication especially in patients with emergency surgical conditions who usually present with third space losses with potential for multi-organ failure. All efforts should be taken to have proper fluid protocols written for ease of follow by all involved in the prescription and monitoring of the patients.

CHAPTER NINE

9.0 CONCLUSION AND RECOMMENDATION

9.1 CONCLUSSION

At MNH, fluid prescription follows liberal patternsince there was no evidence of calculated formula in the prescription with DNS/RL combination being the most common. The same combination and volume was literally prescribed to all patients regardless of sex, weight, renal status, serum electrolytes, input/output status and type of surgery. Similarly, surgeons prescribed fluid did not match nurses' fluid administration records with both under and over recordings noted. Post-operative electrolytes monitoring was not uniformly done to all patients to determine fluids replacement adequacy.

9.2 RECOMMENDATION

i. MNH surgical departments should establish clear guidelines on fluid therapy and its monitoring.
ii. Doctors and physicians need to communicate their orders clearly beyond the written documents to improve patient care
iii. Cost and health consequences of liberal fluid administration should be investigated in a large study among laparotomy patients.

10.0 REFERENCE

1. Schreiber MA, Tieu B, Kiraly L, Englehart M. Resuscitation Fluids. new Engl J o f Med. 2013;369:1243–51.
2. Moritz ML, Ayus JC, Ingelfinger JR, Moritz ML, Ayus JC. Maintenance Intravenous Fluids in Acutely Ill Patients. N Engl J Med. 2015;373(14):1350–60.
3. Corcoran T, Emma Joy Rhodes J, Clarke S, Myles PS, Ho KM. Perioperative fluid management strategies in major surgery: A stratified meta-analysis. Anesth Analg. 2012;114(3):640–51.
4. Lassen K. Intravenous fluid therapy. Br J Surg. 2009;96(2):123–4.
5. Singh RR, Shekhar S, Akhtar J, Shankar V. Serum electrolyte changes in major surgical trauma. Int J Res Med Sci. 2016;4(7):2893–6.
6. Birgitte Brandstrup, Hanne Tønnesen, Randi Beier-Holgersen M. Effects of Intravenous Fluid Restriction on Postoperative Complications. Ann Surg. 2003;238(5):1–5.
7. Itobi E, Stroud M, Elia M. Impact of oedema on recovery after major abdominal surgery and potential value of multifrequency bioimpedance measurements. Br J Surg. 2006;93(3):354–61.
8. Strunden MS, Heckel K, Goetz AE, Reuter DA. Perioperative fluid and volume management: physiological basis, tools and strategies. Ann Intensive Care. 2011;1(1):2.
9. Benes J, Chytra I, Altmann P, Hluchy M, Kasal E, Svitak R, et al. Intraoperative fluid optimization using stroke volume variation in high risk surgical patients: results of prospective randomized study. Crit Care. 2010;14(3):R118.
10. Lopes MR, Oliveira MA, Pereira VOS, Lemos IPB, Otavio J, Jr CA, et al. Goal-directed fluid management based on pulse pressure variation monitoring during high-risk surgery : a pilot randomized controlled trial. Crit Care. 2007;11(5):1–9.
11. Voldby AW, Brandstrup B. Fluid therapy in the perioperative setting — a clinical review. J Intensive Care. 2016;

12. Malbouisson LMS, Silva JM, Carmona MJC, Lopes MR, Assunção MS, Valiatti JL dos S, et al. A pragmatic multi-center trial of goal-directed fluid management based on pulse pressure variation monitoring during high-risk surgery. BMC Anesthesiol. 2017;17(1):1–10.

13. Lobo DN, Bostock KA, Neal KR, Perkins AC, Rowlands BJ, Allison SP. Effect of salt and water balance on recovery of gastrointestinal function after elective colonic resection: A randomised controlled trial. Lancet. 2002;359(9320):1812–8.

14. MacKay G, Fearon K, McConnachie A, Serpell MG, Molloy RG, O'Dwyer PJ. Randomized clinical trial of the effect of postoperative intravenous fluid restriction on recovery after elective colorectal surgery. Br J Surg. 2006;93(12):1469–74.

15. Holte K, Kristensen BB, Valentiner L, Foss NB, Husted H. Liberal Versus Restrictive Fluid Management in Knee Arthroplasty : A Randomized , Double-Blind Study. Int Anesth Res Soc. 2007;105(2):465–74.

16. Nisanevich V, Felsenstein I, Almogy G, Weissman C, Einav S, Matot I. Effect of Intraoperative Fluid Management on Outcome after Intraabdominal Surgery. 2017;(1):25–32.

17. Powell-Tuck J, Gosling P, Lobo D. British consensus guidelines on intravenous fluid therapy for adult surgical patients (GIFTASUP). London NHS Natl. 2009;1–50.

18. De Silva a. N, Scibelli T, Itobi E, Austin P, Abu-Hilal M, Wootton S a., et al. Improving peri-operative fluid management in a large teaching hospital: pragmatic studies on the effects of changing practice. Proc Nutr Soc. 2010;69(04):499–507.

19. Prough DS, Svense CH. Goal-directed Perioperative Fluid Management. Anesthesiology. 2009;110(3):453–5.

20. Gordon RE, Kassier SM, Biggs C. Hydration status and fluid intake of urban, underprivileged South African male adolescent soccer players during training. J Int Soc Sports Nutr. 2015;12(1):1–10.

21. Kayilioglu SI, Dinc T, Sozen I, Bostanoglu A, Cete M, Coskun F. Postoperative fluid management. World J Crit care Med. 2015;4(3):192–201.

22. Voldby AW, Brandstrup B. Fluid therapy in the perioperative setting-a clinical review. J intensive care. 2016;4(1):27.

23. Nisanevich V, Felsenstein I, Almogy G, Weissman C, Einav S, Matot I. Effect of intraoperative fluid management on outcome after intraabdominal surgery. Anesthesiology. 2005;103(1):25–32.

24. Bamboat ZM, Bordeianou L. Perioperative Fluid Management. Clinics. 2009;1(212):28–33.

25. NICE. Intravenous fluid therapy in adults in hospital NICE guideline. 2013;(May):13.

26. Chesney RW. The maintenance need for water in parenteral fluid therapy. Pediatrics. 1998;102(2 Pt 1):399–400.

27. Vermeulen H, Hofland J, Legemate DA, Ubbink DT. Intravenous fluid restriction after major abdominal surgery: a randomized blinded clinical trial. 2009;10:50.

APPENDICES

APPENDIX No 1-UK National guideline on Post-Operative Intravenous Fluid

1. The details of fluids administered must be clearly recorded and easily accessible.
2. When patients leave the theatre, their volume status should be assessed, the volume and type of fluids given perioperative should be reviewed and compared with fluid losses in the theatre, including urine and insensible losses.
3. In patients who are euvolaemic and haemodynamically stable, a return to oral fluid administration would be achieved as soon as possible.
4. In patients requiring continuing IV maintenance fluids, these should be low in Na and of low-enough volume until the patients have returned their Na and fluid balance over the peri-operative period to zero. When this has been achieved, the IV fluid volume and content should be those required for the daily maintenance and replacement of any on-going additional losses.
5. In patients who are oedematous, hypervolemia if present must be treated followed by a gradual persistent negative Na and water balance based on urine Na concentration or excretion.(17)

APPENDIX No. 2 - Informed Consent Form (English Version)

ID No……

Consent to participate in the study on;

"Fluid Management Pattern among post laparotomy patients at Muhimbili National Hospital, Dar es Salaam Tanzania".

I am Dr. ZAKARIA, James Clement, a postgraduate student at MUHAS taking master degree in surgery, working on the research titled above.

Purpose of the study:
Pattern of fluid management in post laparotomy patiets at muhimbili national hospital, dar es salaam tanzania, between March 2017 and December 2017.

What Participation Involves:
If you agree to participate in this study, you will be interviewed using a questionnaire, detailed information on social demographic characteristics, past medical history and physical examination will be requested and a follow up of care for your condition will be done.

Confidentiality:
All information collected will be entered into a password protected computer, the questionnaires will be handled in confidence. Your name will not be used anywhere through to data analysis and report development.

Risks:
The researcher anticipates no harm will happen to you as you participate in this study.

Rights to Withdraw and Alternatives:

Taking part in this study is completely your choice. If you choose not to participate or if you decide to stop participating, you will receive all services that you would normally get from this hospital. You can stop participating in this study at any time, even if you have already given your initial consent. Refusal to participate or withdrawal from the study will not involve penalty or loss of any benefits to which you are otherwise entitled.

Benefits:

If you agree to take part in this study, you will benefit from timely explanation and follow up of investigation results and be updated on any plans regarding treatment and will be advised accordingly.

Cost:

No payment will be requested from you as a fee to participate in this study.

In Case of Injury:

The researcher does not anticipate that any harm will occur to you or your child because of participation. However, if any physical injury results from participation, we will provide you or your child with medical treatment according to the current standard of care in Tanzania.

Whom to Contact:

If you ever have questions about this study, you should contact the study Principal Investigator, Dr. ZAKARAIA James Clement, Muhimbili University of Health and Allied Sciences, P.O. Box 65001, Dar es Salaam. E-Mail address: zakariaj333@gmail.com Mobile No: +255715860033.

If you ever have questions about your rights as a participant, you may call Dr. Joyce Masalu, Chairman of the Senate Research and Publications Committee, P.O. Box 65001, Dar es Salaam. Tel: 2150302-6.

Agreement of Participation

I, ……., identification number……, have read the contents in this form and with satisfaction, agree to participate in this study.

Signature of participant/guardian ……

Signature of witness (if participant cannot read) ……..

Signature (research assistant) ……Date……

KIAMBATANISHO Na. 3 –FomuyaRidhaa(Swahili Version)

ID No……

Ridhaayakushirikikatikautafitijuuya;
"**MuenendowautoajihudumayaUgiligilibaadayakufanyiwaupasuajiwatumbonikatikahospitaliyaTaifa Muhimbili".**

Naitwa Dk. ZAKARIA James Clement, mwanafunziwaShahadayaUzamilikatika Chuo Kikuu cha AfyanaSayansizaTiba Muhimbili (MUHAS) katikaupasuaji. Nafanyautafitiwenyekichwa cha habarikamamaelezoyaliyopohapojuu.

Madhumuniyautafiti:
KujuamuenendowautoajihudumayaugiligilibaadayakufanyiwaupasuajiwatumbonikatikahospitaliyaTaifa Muhimbili waHospitaliyaTaifa Muhimbili.

Jinsiyakushiriki:
Kama utakubalikushiriki, utahojiwamaswalimachachekuhusutaarifayako, tarifazazamanizaafyana pale patapohitajikakukufanyiauchungua, utaombwaridhaayako.

Utunzajisiri:
Taarifazotezitakazokusanywazitatunzwakwausiri, nabilauwepowajina la mgonjwa.

Madhara/Athari:
Mtafitihatarajiikutakuwanamadharayoyotekutokananautafitihuu.

Uhuruwakushiriki:
Kushirikikatikautafitihuunihiariyako. Kama utachaguakutokushiriki, utaendeleakupokeahudumazotekamakawaidakutokahospitalihii.
Unawezakuachakushirikikatikautafitihuuwakatiwowote, hatabaadayakutoaidhiniyakoyaawali.

Faidazautafiti:

Kama utashirikikatikautafitihuu, utapewamaelezokuhusunakufuatiliwamajibu, nakujulishwamipangoyatibanakupewaushauriutakapohitajika.

Gharama:

Hakunamalipoyoyoteutakayotozwakamaadayakushirikikatikautafitihuu.

Taarifa/Mawasiliano:

Endapoutahitajikupatamaelezozaidi au taarifayoyotekuhusuutafitihuu, wasilianana Dk. ZAKARIA James Clement, Chuo Kikuu cha AfyanaSayansizaTiba Muhimbili, S.L.P 65001, Dar es Salaam. Baruapepe: zakariaj333@gmail.com. SimuyaMkononi: +255715860033.

kamautakuwanamaswalikuhusuhakiyakokamamshiriki, unawezawasilianana Dr. Bruno Sunguya, MwenyekitiwaUtafiti, S.L.P 65001, Dar es Salaam. SimuNambari: 2150302-6.

IdhiniyaKushiriki

Mimi……,

mwenyenambariyaushiriki……..nimeelezwananimesomayaliyomokatikafomuhii, maswaliyanguyamejibiwananikaridhika. Nimekubalikushirikikatikautafitihuu.

SahihiyaMshiriki/Mlezi; …….....……

SahihiyaShahidi (kamaMshiriki/Mlezihajuikusoma); …….....……

Sahihi(MtafitiMsaidizi); …….....……Tarehe; ……...…...……

APPENDIX No. 4–CASE REPORT FORM (ENGLISH VERSION):

TITLE:FLUID MANAGEMENT PATTERN AMONG POST LAPAROTOMY PATIENTS AT MUHIMBILI NATIONAL HOSPITAL, DAR ES SALAAM TANZANIA

I. IDENTIFICATION DETAILS:

Code no: …….

Hospital Reg. No……..

Age; …..

Sex; MALE ☐ MALE ☐

Date …../……/2017

Ward patient admitted

a. ICU ☐
b. Ward 9 ☐
c. Ward 11 ☐
d. Ward 12 ☐
e. Ward 13 ☐

Date of Admission……Date of surgery……..

Type of surgery; Elective ☐ Emergency ☐

Procedure done;

Post-operative diagnosis……..

Duration of surgery ……..

Outcome; Date ……Discharged ☐ Deceased ☐

Number of days admitted ……

If number of days admitted ≥ 5 days give comment

……

……

III. LABORATORY RESULTS:

Item	Pre-operative	Post-operative		
Weight (kg)				
WBC (K/ul)				
Hb (g/dl)				
Platelet (K/ul)				
Creatinine ($Mmol^{-1}$)				
BUN ($Mmol^{-1}$)				
Sodium ($Mmol^{-1}$)				
Potassium ($Mmol^{-1}$)				
Chloride ($Mmol^{-1}$)				

IV. CLINICAL ASSESSMENT TABLE

Item	Day 1	Day 2	Day 3	Day 4	Day 5
Input (mls)					
Output Urine (mls)					
Drain (mls)					
Balance (mls)					
Balance carried over(mls)					
RBG (Mmol/L)					
BP (mmHg)					
Pulse (bpm)					
Temperature (^0C)					
Lung Crepitation					
Temperature of extremity					
Peri-orbital edema					
Peripheral edema					
Liver tenderness					
ECG					
ECHO					

V. FLUID PRESCRIPTION

Type of fluid /Fluid combination			NS	RL	DNS	D5%	Other
Pre-operative	Received						
Intra-operative	Received						
Post - operative	Day one	Prescribed					
		Received					
	Day two	Prescribed					
		Received					
	Day three	Prescribed					
		Received					
	Day four	Prescribed					
		Received					
	Day five	Prescribed					
		Received					