EFFECT OF INTRAPARTUM NORMAL SALINE AND DEXTROSE-SALINE INFUSION ON COURSE OF LABOUR AND NEONATAL OUTCOMES AMONG NULLIPAROUS WOMEN IN KENYATTA NATIONAL HOSPITAL

(A RANDOMIZED DOUBLE BLINDED CONTROLLED TRIAL)

Principal Investigator:

DR. IRENE MOKEIRA OYARO

H58/87579/2016

DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY

A dissertation submitted in partial fulfillment of the degree of Masters of Medicine (Mmed) Department of Obstetrics and Gynecology, Faculty of Health Sciences, University of Nairobi.

2022

DECLARATION

By submitting this dissertation, I declare that the entirety of the work contained therein, is my own original work, and that it has not previously, in its entirety or in part, been submitted in any university for the award of a degree.

Signature:..... Date:9/5/2022.....

Irene Mokeira Oyaro: MBChB

SUPERVISORS' APPROVAL

This dissertation has been submitted with the approval of the following supervisors:

Signature:..... **Date:** 26th April 2022

Prof. Omondi Ogutu, MBChB (Obs/Gyn),FCOG, PGDRM

Associate professor, Department of Obstetrics and Gynecology,

Faculty of Health Sciences, University of Nairobi.

Signature:..... **Date:** 26/4/2022.

Dr. A. B. Kihara, MBChB, Mmed (Obs/Gyn)

Senior Lecturer, Department of Obstetrics and Gynecology,

Faculty of Health Sciences, University of Nairobi

Signature:..... **Date:** 26.04.2022.

Dr. Philomena Owende, MBChB, MMED (Obs/Gyn), DMAS

Senior specialist, Department of Obstetrics and Gynecology, Kenyatta National Hospital

Signature:..... **Date:** 27/04/2022.

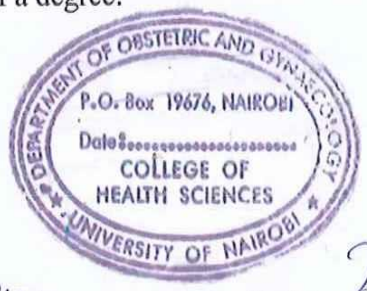
Dr. A. N. Bosire, MBChB, Mmed (ObsGyn)

Lecturer, Department of Obstetrics and Gynecology,

Faculty of Health Sciences, University of Nairobi.

CERTIFICATE OF AUTHENTICITY

This is to certify that this dissertation is the original work of Dr. Irene Mokeira Oyaro, Masters of Medicine student H58/87579/2016 in the Department of Obstetrics and Gynecology, Faculty of Health Sciences, University of Nairobi, under the guidance and supervision of the aforementioned supervisors: – Dr.A.B. Kihara, Professor Omondi Ogutu, Dr. P. Owende and Dr. A.N. Bosire. This dissertation has not been presented in this or any other university for the award of a degree.



Signature:..... **Date:** 27/04/022.

Professor Eunice J. Cheserem, MBChB(Obs/Gyn), PGDRM, Fell. Gyn/Onco

Associate professor, Department of Obstetrics and Gynecology,

Consultant, Obstetrician and Gynaecologist, Kenyatta National Hospital,

Chairperson Department of Obstetrics and Gynaecology, University of Nairobi.

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LIST OF ABBREVIATIONS AND ACRONYMS

APGAR	Appearance, Pallor, Grimace, Activity, Respiration
CPD	Cephalo – Pelvic Disproportion
C S	Caesarian Section
D5%	5% Dextrose Solution
D5%-NS	5% Dextrose – Normal Saline Combination
KNH	Kenyatta National Hospital
NS	Normal Saline

OPERATIONAL TERMS

Active Phase of Labor: a period characterized by regular painful uterine contractions, a substantial degree of cervical effacement and more rapid cervical dilatation from 6 cm to 10 cm for first and subsequent labors.

First Stage of Labor: a period starting with uterine contractions leading to complete cervical dilation and is divided into latent and active phases.

Second Stage of Labor: the period between full cervical dilatation and birth of the baby, during which the woman has an involuntary urge to bear down, as a result of expulsive uterine contractions.

Nulliparous: a woman who has never given birth before

Arrest of First Stage of Labor (Labor Dystocia): four hours or more of adequate contractions or six hours or more of inadequate contractions and no cervical change.

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ABSTRACT

Background: Labor is associated with an increased demand for energy due to increased skeletal and smooth muscle contractions. Adequate hydration and optimal glucose levels improves muscle performance during vaginal delivery. However, parturients have little if any nutritional intake by mouth during labor. It is thus important to evaluate the impact of intra-partum dextrose infusion on labor and pregnancy outcomes. In this study, it was hypothesized that intra-partum dextrose-saline infusion will cause significant reduction in the length of labor; taking participants on intra-partum plain normal saline infusion as the control group.

Objectives: The objective of the study was to compare the effect of intra-partum infusion of dextrose 5% in normal saline versus plain normal saline on the progression of labor and neonatal outcomes among nulliparous women admitted with spontaneous labor at the Kenyatta National hospital (KNH).

Methodology: In this simple randomized, double blinded controlled trial conducted in KNH labor ward; 198 term, nulliparous women with singleton pregnancies in active phase of labor, were divided into two groups and scheduled to receive either 175mL/hour of 5% dextrose in normal saline or 175mL/hour of normal saline for the duration of labor. Course of labor was assessed by length of active phase of labor (cervical dilatation of ≥5cm to fully dilated cervix), need for augmentation of labor with oxytocin and mode of delivery. Neonatal outcomes were assessed by Apgar score at 5 minutes. The data was then entered into an excel sheet, cleaned and analyzed using R Software. The homogeneity of the socio demographic characteristics and APGAR scores was evaluated using one way ANOVA. A Chi Square test of association for the length of labor and duration of second stage was applied, while Fischer exact test was used to compare the mode of delivery.

Results: A total of 204 participants were assessed for eligibility, out of which 6 were excluded. The 198 participants were enrolled (99 in each arm) and randomized for follow up; 90 participants were analyzed from each arm. The demographic and clinical characteristics of the participants across the two groups were similar. The mean duration for the active phase of labor was 5.73hrs (sd 2.25) for 5% DNS group and 5.94hrs (sd 2.66) for the NS group, p=0.268; this was not significant statistically. Though not significant statistically, patients in the 5% DNS arm were 18% less likely to labor for more than 5hours from onset of fluid administration (OR, 0.827, CI 0.41-1.66, p, 0.59). Patients in the 5% DNS arm were 2 times more likely to have oxytocin infused, (CI 0.82-4.29, p=0.13). Having an infusion with 5%DNS was associated with less CS and having a more favorable APGAR score (OR, 0.696, CI 0.35-1.38, p=0.298 and OR 0.101, CI 0.013-0.816, p=0.018 respectively). Additionally there was a statistically significant shorter duration of the second stage among patients on 5% DNS compared to those on NS infusion (OR , p=0.015)

Conclusion: Administration of intra-partum dextrose containing intravenous fluid was not significantly associated with mean duration of active phase of labor, infusion with oxytocin and Cesarean delivery. Using 5% DNS however is significantly associated with a shorter duration of second stage of labor and better APGAR scores. From the study findings, use of dextrose containing intravenous fluid during labor does confer benefit on second stage of labor and neonatal outcomes over non-dextrose containing intravenous fluids.

Key words: Labor Length, Dextrose 5% in saline, Normal Saline, Pregnancy Outcomes

CHAPTER ONE: INTRODUCTION

1.1 Background

The course of labor is dependent on several factors, mainly – adequacy of the pelvis, fetal body size/weight and performance of muscles (mainly uterine and pelvic floor). While the former two are constant/non-modifiable factors during labor, the latter is a factor that can be adjusted to alter the course of labor. As labor is associated with an increased demand for energy due to increased skeletal and smooth muscle contractions, most maternity units encourage parturients to feed during labor. This is in keeping with 2018 guidelines of ACOG -American College of Obstetrics and Gynecology (1).

Many parturients therefore receive intravenous fluids (IVF), either to supplement oral intake or to keep them hydrated and energetic when oral (by mouth) fluids are not achievable or are restricted due to the parturient's state. The three commonly used fluids include plain normal saline, lactated Ringer's solution, and dextrose solutions (2). Several studies have intimated that appropriate use of intravenous fluids significantly reduces the length of labor and in essence improves maternal and fetal outcomes (3). Few studies have however been conducted in the African population to compare the types and infusion rates of intravenous fluids used during labor and their outcomes.

1.2 Process of Labor

Labour begins with uterine contractions that lead to cervical dilation and effacement and finally the expulsion of the products of conception. Ineffective uterine contractions with

pelvic inadequacy are among many reasons that lead to poor progress and therefore prolonged labour. Abnormal or slowly-progressing labour (dystocia) is a major risk factor for caesarean deliveries among nulliparous women, with adverse physical and psychological effects on the baby and the mother reported (4).

Labor suggests physical work (which may be prolonged), pain (which may be severe), and anxiety. During childbirth, the body's demand of hydration and energy further increases. Different methods for accelerating delivery are commonly practiced (routine amniotomy, oxytocin augmentation, administration of hyoscine butyl bromide etc.) These methods are not universally effective, may cause adverse neonatal effects, and disturbances to the regulation of uterine contractions, blood pressure, fluid balance, and placental function (5).

1.3 Factors Influencing the Course of Labor

Many factors influence the course of labor and studies have been carried out to improve the understanding of normal labor progression. In addition to the traditionally known factors such as pelvic size and shape, size of the fetus, position and lie of the fetus, there has also been an increased effort to identify other modifiable factors that may reduce the need for cesarean deliveries (5).

Human labor is equated to a period of persistent exercise. The laboring uterus and supportive muscles of the abdominal wall and lower limbs are exerted for a long period of time, as is the case with rigorous exercise. In sports medicine, many studies have found that replacing fluids while working out not only prevents dehydration but also improves the performance of the body (6). Extrapolated to the smooth muscle activity of the uterus, such data offer insights why dehydrated or inadequately hydrated parturients might have a prolonged labor (7).

Blood supply to the uterus is not auto regulated. Therefore, whenever there is a reduction in the intramuscular (as is common with dehydration), blood is channeled away from the uterus, which worsens the problem (3). The fluid surrounding the muscle fibers of dehydrated patients have altered acid-base balance, which results in a decrease in the pH, in turn affecting calcium signaling and the force with which muscles contract, therefore prolonging the duration of labor (8). Adequate hydration in labor may therefore optimize the laboring, uterine exercise, and therefore prevent prolonged labor and its attending negative effects.

The stress of labor often increases the need for glucose metabolism. With glycogen stores are depleted because of inadequate oral intake and prolonged muscle use, there risk of ketosis (buildup of ketone bodies) increases. A link between prolonged labour and ketosis has been described (9). Dextrose containing fluids may therefore do more than correct dehydration. They also correct the glycogen deficit that arises with prolonged muscle use – as is the case in labor.

1.4 Glucose Metabolism and Labor

Carbohydrates, as an essential energy-source for the body, drives most biochemical reactions in all living cells, which includes myocytes. During glycolysis, energy is produced when two molecules of pyruvate are produced from as a glucose molecule. When glucose levels surpass the body's needs of invertebrates, glucose is converted into a storage from called glycogen through the process of glycogenesis. However, when glucose and therefore energy is in short supply, the body breaks down glycogen through glycogenolysis to boost energy levels.

Non-carbohydrate precursors also act as a source of glucose by the process of gluconeogenesis. The cells of the body convert a glucose derivative called glucose-6-phosphate to ribose-5-phosphate - a sugar that is essential for the synthesis of nucleic acids and nucleotides, and other monosaccharides. A cellular reducing agent, NADPH, is also produced through this pathway.

The metabolism of carbohydrates revolves around the synthesis and consumption of glucose, which is also the main fuel for the cells of most organisms. In vertebrates, the transportation of throughout the body is through the blood. Whenever the energy reserves of cells are low, the glycolytic pathway is activated, which leads to the degradation of glucose. When an immediate burst of energy is unnecessary, glucose molecules are converted into glycogen and stored in muscles or the liver. The energy requirements of the red blood cells, the brain, and exercise require a constant flow of glucose. Moreover, depending on the metabolic requirement of the cell in question, the synthesis of fatty acids, monosaccharides, and amino acids is also probable.

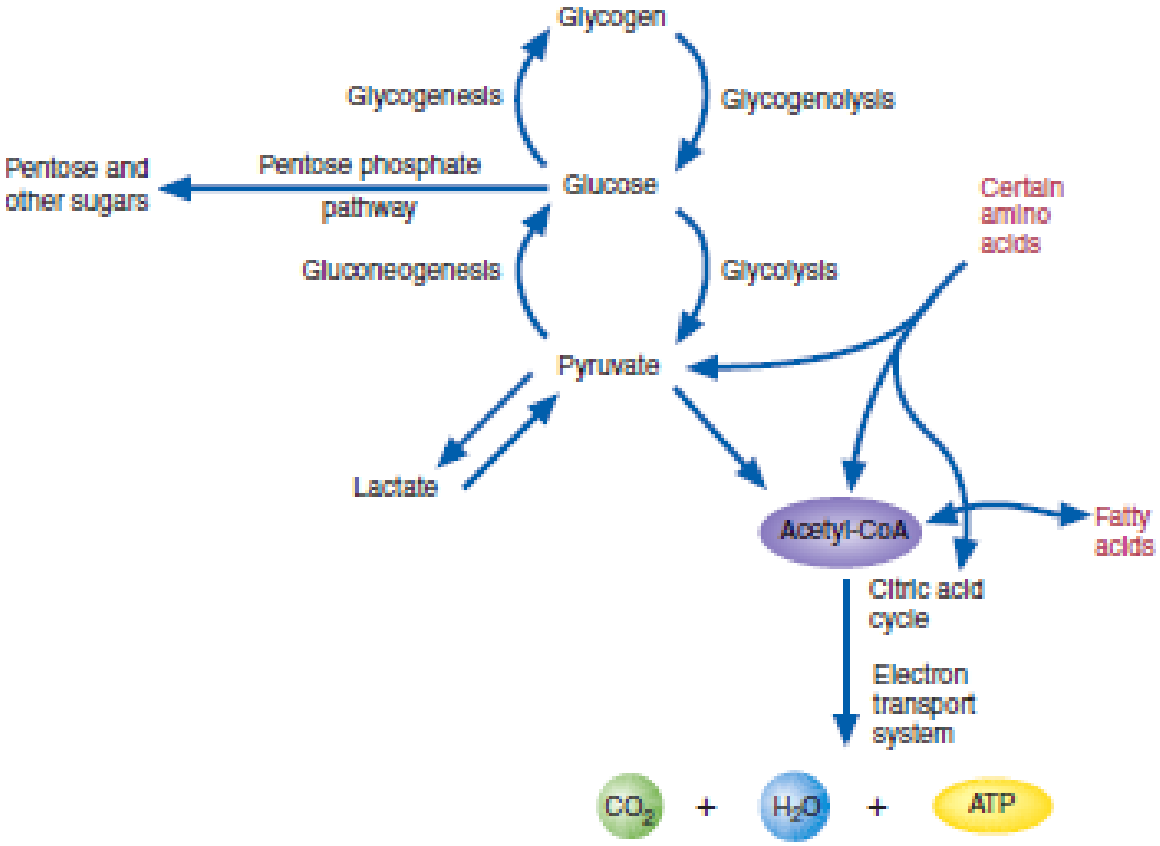


Figure 1: Glucose Metabolism (Adapted from Biovision incorporated)

Labor leads to an increase in glucose utilization. Glucose is the main energy source for the labouring uterus. Therefore, ample supple is crucial to boosts the strength of parturients as she goes through labour. Adequate glucose stores are necessary for maintaining muscle efficiency and exercise tolerance. The oxidative pathway supplies most of the energy used during labour.

Lack of adequate maternal glucose due to starvation or hyperemesis during labour, causes a shift from carbohydrate metabolism to fat metabolism, with resultant increased production of unsaturated fats and ketone bodies (acetoacetate acid and beta-hydroxybutyrate and) in the blood. If ketogenesis is sustained for too long, the body's normal buffering capacity becomes

overwhelmed with resulting metabolic acidosis, with an increased anion gap. Increased levels of ketone bodies in the blood of mothers predispose foetus to acidosis, with resultant hypoxia.

1.5 Types of Intravenous Fluids in the Course of Labor

Because adequate hydration during labour increases the performance of uterine muscles, it may improve the labor progress. It therefore is possible that prolonged or dysfunctional labour, which are major indications for a primary cesarean delivery, might be a result of uncoordinated or inadequate uterine contractions.

When required for medical reasons, the type of intravenous fluid administered and the rate of its infusion should be determined on an individual basics(10). Plain Normal saline and Lactated Ringer's solution allow water to flow within cells (*isotonic solutions*) without the cells lysing or shrinking. Even though dextrose in water is also an isotonic solution, it also provides calories that satisfy the body's need for energy. It however becomes hypotonic (the concentration of electrolytes becomes lower than in plasma) once in the body, because the solute (glucose), is metabolized rapidly in cells thus leading to pulling of water into the cells, leading to cell lysis.

The administration of plain dextrose solution has been shown to cause low blood sodium (salt) levels. As a result, dextrose solutions should be mixed with Ringer's lactate solution or normal saline to increase the safety of parturients. Intrapartum infusion of normal saline dextrose 5% offers both hydration and the energy needs of the patients by increasing the substrate (glucose) for ATP. This prevents anaerobic metabolism which would otherwise lead

to production of harmful metabolites (e.g., lactate, alanine, and acetate) that compromise uterine contractions. Ultimately, this not only shortens the duration of labour but also improves neonatal outcomes.

Fluid use in pregnancy should however be used with caution as it may lead to hypervolemia with resultant excessive fluid collection in the lungs and the heart with resultant congestive cardiac failure (11). Young people with healthy kidneys and hearts that can handle the increase in blood volume have a lower risk of developing cardiac failure (12).

CHAPTER TWO

2 LITERATURE REVIEW

2.1 Introduction

Adequate hydration during labor coupled with optimum glucose intake has been shown to improve duration of labor, with the overall effect of reduction in caesarean section rates and good Apgar score. Rate of cesarean deliveries has been increasing globally at an alarming 4%annually , with a current standing at 21%(13). In Kenya, 1 in every 4 hospital deliveries in Nairobi is through a cesarean section. (14). This is above the global rate 21%.Safe prevention of unnecessary caesarean deliveries is now a focus of Ministry of Health in Kenya, in a bid to curb the drastic rise in caesarean births noted over the last decade.

Among nulliparous women, poor progress/prolonged labour is a common cause of caesarean section, with resultant adverse maternal-foetal effects (4). Studies have shown that intra-partum use of dextrose containing intravenous fluids may be a simple and cost-effective way of shortening labour and lessening the need for CS delivery among nulliparous women (15,16)

2.2 Fluid Therapy during Labor

The ACOG 2018 guidelines encourage per oral intake of fluids and discourage routine intravenous fluid administration for the purpose of shortening labor, citing lack of evidence of benefit over risk and the possibility of fluid overload should the parturient need oxytocin

infusion later in the course of labor (1). However, optimal amounts of fluid intake are not guaranteed via the oral route due to the pain and hyperemesis associated with labor

WHO further advocates for patience with regards to slow yet normal cervical dilatation to avoid over-medicalization of childbirth (oxytocin augmentation and operative deliveries). However, in low resource settings, hastening the progress of labor is advantageous to the health worker as well as the parturient. In a review of qualitative studies evaluating the experiences of intra-partum care providers, organizational time pressures and staff shortages limited the ability of care providers to manage longer labors (17).

Another review of qualitative studies on what matters to women during intra-partum care found that most parturients prefer a shorter labor, and they want normal childbirth as compared to operative deliveries (18). However, recent literature is awash with conflicting results on intra-partum intravenous infusion. Possible explanations for the conflicting results is small sample size, non-standard infusion rates, and the use of different types of intravenous fluids in different studies, to name a few.

2.2.1 A Comparison of Oral versus Intravenous Fluid

In the Cochrane review by Dawood *et al.* in 2013 (19), two of the trials included in the review, indicated a reduction in the duration of labour for women who received IVFs than those who got oral fluids only. However, when oral fluids are not restricted, a considerable variation in fluid consumption by volume was reported in Dawood's trials and between different trials. In addition, the risk of bias was variable between the studies and their results inconsistent.

Direkvand-Moghadam and Rezaeian in 2012 randomly assigned 120 women to different groups (oral intake only or oral+ Ringer's Lactate at various infusion rates- 60ml/hour; 120ml/hour and 240ml/hour). Longer first and second stages of labor were noted in women who did not receive intravenous fluids (20). However, Kavitha *et al*. 2012 compared oral intake of fluids to two different intravenous fluid regimens (Ringer's Lactate 125ml/hour and Ringer's Lactate at 250mL/hour and found no statistically significant difference in mode of delivery and neonatal and maternal complications of among the women in the three study groups (21).

2.2.2 A Comparison of Different Types of Intravenous Fluids

Shrivastava et al.2009 compared duration of labor between women on plain Normal saline, Saline with 5% Dextrose and Saline with 10% Dextrose all at an infusion rate of 125ml/hour.. Regardless of concentration, administration of a dextrose containing fluid shortened labor in nulliparous women in spontaneous labor (22). Sharma *et al*. in 2012 found similar results when comparing women on plain normal saline to those on saline with 5% dextrose (16).

2.2.3 A Comparison of Different Infusion Rates

In a Cochrane review by Dawood *et al*. 2013 (19), four trials (Garite *et al*. 2000; Maderia *et a*l. 2006; Eslamian *et al*. 2006; Alavi *et al*. 2005) compared different infusion rates. The combined results from the four trials indicated that women who received 125 mL/hr IV fluids compared to 250 mL/hr had longer labours by about 1 hour and 30 minutes. Moreover, the risk of CS deliveries was significantly higher among parturients who received IV fluids at 125 mL/hr than 250 mL/hr. However, because the incidence of operative vaginal births were

comparable in both study groups, the data was insufficient for drawing conclusion on fluid overload.

In another Cochrane review, a trial of 20 randomly recruited first time mothers with low risk pregnancies at 3-5cm cervical dilation were administered either a 5% dextrose solution of normal saline at a rate of 175 mL/hr and outcomes compared (23). After a review of data, patients who were administered 5% dextrose solution with normal saline experienced shorter labours buy up to three hours. The need for labour augmentation with oxytocin was also lower in the experimental group compared to the control group. However, rates of caesarean delivery, Apgar scores, and maternal blood sodium levels were comparable between the study groups.

Another trial of 274 randomly-assigned low-risk mothers (first time) with a cervical dilation of 3-5cm ti wither a 250 mL/hr normal saline group or 125 mL/hr of 5% dextrose in normal saline or 250 mL/hr of 2.5% dextrose in normal saline was reviewed (24). Labour outcomes did not vary by the rate of administration of IV fluids nor the amount of dextrose administered. The duration of labour, occurrence of postpartum haemorrhage (PPH) duration, caesarean section rates, NICU admission, and Apgar scores or neonates were also comparable between groups.

A meta-analysis of seven trials by Ehsanipoor et al. (2017) (25) reported consistent results with the four pooled trials analysed in the 2013 Cochrane review by Dawood et al. In the study, administration of IV fluids at 125 mL/hr versus 250 mL/hr increased the duration of labour by one and a half hours. The risk of caesarean deliveries for all indications also increased by 30% when parturients received IV fluids at 125 mL/hr. In another meta-analysis

in 2017, women treated with IV fluids at 250 mL/hr versus 125 mL/hr had a lower risk of caesarean deliveries (23). However, when women were allowed to drink freely, the result could not be generalised to the population. During the study, the 18 patients checked had strict restrictions of oral intake.

A study conducted in Egypt by Gebran Ebrahim Ghonemy et al. (2017) reported shorter lengths of labor with larger volumes of the Ringer's Lactate solution (26). According to Kavitha et al. (2012), no difference was observed between the group receiving IVFs at a higher infusion rate (250ml/hour) than the group receiving at IVFs at 125ml/hour(26)

A Cochrane review by Coco et al in 2010 (27), analysed parturients who were administered fluids at 125 mL/hour versus 250 mL/hour and were allowed to drink freely. In addition, one of the reviewed studies had randomized patients into "usual care", which was equivalent to patients who received IV fluids under the observation of a provider for medical reasons vis a vis continuous administration of IVF during labour.

The women in the IV fluids group were administered an average of 2,660 milliliters of IV fluids, while those in the "usual care" group got an average of 1,627 milliliters of IV fluids during labor, which was equivalent to 125 mL/hr. During the experiments, parturients in both group were at liberty to drink as much water or beverages (juice and soda) as they desired. With regard to length of stages of labour and the total length of labour, labour augmentations, and CS deliveries, no significant differences were reported.

The combined result from the three trials reported a shortening of the labour duration by 24 minutes in parturients who received IV fluids at 250 mL/hour and drunk freely compared to

those who received IV fluids at 125 mL/hour and drunk freely. The rates of caesarian deliveries and all other outcome measures that were analysed were comparable between study groups, which attested the effect of the rate of administration of fluids on labour progression. Overall, women who do not receive IV fluids or receive fluids at a slow rate (less than 250 mL/hour) should be encouraged to drink to achieve adequate hydration and thus avoid prolonged labour.

On the contrary, Edwards et al.2014 reported no difference in labor length nor cesarean rates among women receiving Ringer's Lactate with 5% Dextrose at different rates(125ml/hour; 250ml/hour; 25ml/hour) (28). A meta-analysis of seven trials evaluating effect of different infusion rates on duration of labor (125ml/hour versus 250ml/hour) conducted by Ehsanipoor et al. in 2017(25) found that a higher infusion rate (irrespective of the type of fluid) for low-risk nulliparous women in spontaneous labor appeared to be a safe way to reduce the duration of labor (by almost one hour) and need for caesarean delivery.

2.3 Impact of Intravenous Fluids on Maternal and Fetal Outcomes

Muscle contraction over short periods of time relies on intramuscular glycogen stores to act as source of adenosine triphosphate (ATP), which provides the fuel/energy for muscle activity. However, prolonged or repetitive use of a muscle over long periods of time (such as is the case during labour) causes depletion of glycogen stores, necessitating the need for extra muscular source of energy such as glucose in the bloodstream to maintain sufficient ATP levels to prevent muscle fatigue.

Prolonged labor therefore leads to overuse of muscles in labor with resultant anaerobic metabolism in the parturient. This leads to increased production and accumulation of both

organic and inorganic acids in the mother. The hyperventilation associated with labor, especially second stage of labor worsens the woman's dehydration and metabolic acidosis significantly interferes with the usual delicate maternal-fetal acid base balance with negative implications on the fetus – fetal metabolic acidosis and resultant hypoxia and organ damage.

Throughout history, midwives have been known to give oral glucose to parturients, especially in second stage of labor with the belief that it boosts the woman's energy levels thus enabling her to bear down easily and effectively leading to a shortened second stage of labor. Use of plain dextrose infusion in labor was however discouraged as it leads to hyponatremia in the mother and fetus (the fluid becomes hypotonic once the body uses up the dextrose). Over the last two decades, studies on use of intra-partum dextrose in saline across the globe have shown overall shortening of the length of labor and positive pregnancy outcomes.

By increasing the rate of hydration of parturients, Garite et al. demonstrated a reduction in the incidence of prolonged labor, caesarian deliveries, and need for augmentation with oxytocin during labour (29). In other studies, the ability of adequate intravenous fluid replacement to lower the requirement for caesarean section deliveries has been demonstrated. The "failure to progress" in labor or incidence of uterine dystocia also reduce (3) as a result of dehydration. However, maternal hydration exceeding 2000mls has been associated with 3.2 times increased risk of excessive neonatal weight loss at day three of life as compared to babies born to mothers who received less than 100ml/hour during labor(30–32)

2.4 Rationale / Study Justification

The routine use of intravenous fluids in labor has not been properly evaluated. Labor is associated with an increased demand of hydration and energy for optimal muscle

performance during vaginal delivery. The type and infusion rate of intravenous fluid administered during labor needs to be elucidated. From the literature review, there are conflicting results about the effect of administration of intrapartum IVF (types and infusion rates) on the course of labor and labor outcomes. Furthermore, there is paucity of data comparing the use of 5% dextrose – normal saline combination and use of normal saline on labor outcomes.

This study aimed to compare plain normal saline to dextrose containing saline infusion each administered at a rate of 175 mls /hour, on the duration of labor, mode of delivery and neonatal outcome (as evidenced by APGAR score). With an assumption of cervical dilatation rate of 1centimetre per 1.5 hours , (maximum of 10.5 hours of labor to reach second stage anticipated for women admitted at cervical dilatation of 3centimetres + an additional maximum 2 hours of second stage); maximum intravenous fluid received was expected to be less than 2500mls. While high infusion rates have been associated with shorter labor duration, use of high infusion rates is associated with risk of maternal and neonatal fluid overload. Therefore, a balance between benefit and risk was carefully sought.

As a national referral facility, Kenyatta National Hospital serves women of varying socio-demographic backgrounds; making this an ideal study setting, as it offered a true representation of the country's diverse demographics. It was therefore necessary to assess the impact of intra-partum dextrose supplementation on the course of labor and on pregnancy outcomes; with the aim of advicing hospital protocols on management of labor, thus ensuring ideal patient care. This will in turn improve pregnancy outcomes.

2.5 Research Question

Does intra-partum dextrose-saline infusion cause significant difference in the course of labor, and improve neonatal outcomes; as compared to intra-partum normal saline infusion?

2.6 Study Hypothesis

There is no difference in the course of labor and neonatal outcomes when 175ml/hour of 5% Dextrose in normal saline is given compared to 175ml/hour of plain normal saline

2.7 Study Objectives

2.7.1 Main Objective

To compare the effect of intra-partum infusion of plain normal saline and dextrose 5% in normal saline on the course of labor (length of active labor, need for augmentation, mode of delivery) and neonatal outcomes among nulliparous women at Kenyatta National Hospital (KNH) between 23rd November 2019-23rd April 2019)

2.7.2 Specific Objectives

To compare, among nulliparous women with spontaneous labor at Kenyatta National Hospital (between 1stSeptember 2019-15th November 2019):

1. The effect of intra-partum normal saline infusion and dextrose 5% in normal saline, on the length of labor(active phase of 1st stage; 2nd stage of labor)
2. The effect of intra-partum normal saline infusion and dextrose 5% in normal saline, on need for augmentation of labor
3. The effect of intra-partum normal saline infusion and dextrose 5% in normal saline, on mode of delivery
4. The effect of intra-partum normal saline infusion and dextrose 5% in normal saline, on neonatal outcomes

2.8 Conceptual Framework

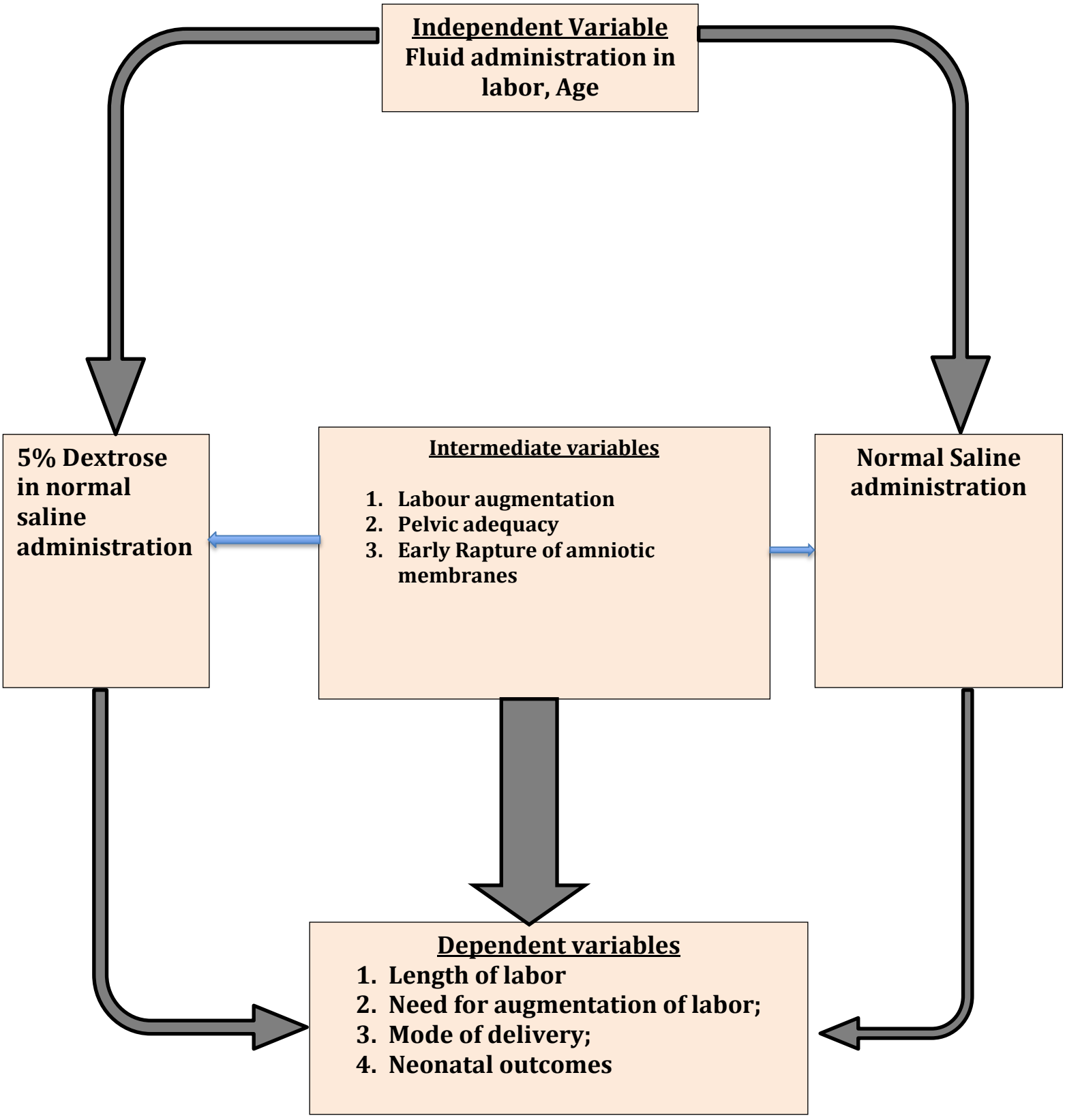


Figure 2: Conceptual Framework

3 CHAPTER THREE: METHODOLOGY

3.1 Study Design

This study adopted a randomized double – blinded controlled trial study design.

3.2 Study Area

The study was conducted at the Kenyatta National hospital (KNH) labor ward. KNH was established in 1901 as a National referral and detaching hospital. Over and above the general service it offers to the residents of Nairobi County, KNH currently serves both as the largest referral hospital in Kenya as well as the clinical training/teaching site for the school of medicine, University of Nairobi. In KNH, the reproductive health department consists of ANC, antenatal wards, labor ward, gynecology/oncology wards, NBU, NICU and adult ICU. The labor ward has two maternity theatres and 32 patient beds (including 7 delivery couches).The maternity unit handles an average of 27,000 deliveries per year, out of which, an average of 10 nulliparous women give birth per day.

Several specialists and registrars (doctors pursuing residency in Obstetrics & Gynecology in the University of Nairobi) manage the units. The labor ward is ran by 20 nurses trained in midwifery and emergency obstetric care; 2 registrars monitoring the patients; 2 registrars covering the maternity theatres and 2 specialist consultants at any given 12 hour shift.

Majority of Kenyans from Nairobi County and across the country (as referrals from the peripheries) seek obstetric care in this facility. KNH has a high patient turnover and a large population base to recruit participants for the proposed study.

3.3 Study Population

The study population entailed nulliparous women admitted with spontaneous onset of labor (cervical dilatation ≥5cm) in the maternity (labor ward) at the KNH for the period 1st August 2019 to 15th November 2019. The control group entailed participants subjected to intrapartum normal saline at an infusion rate of 175ml/hour. The intervention group contained participants subjected to intrapartum dextrose 5%in normal saline at an infusion rate of 175ml/hour.

3.4 Inclusion and Exclusion Criteria

3.4.1 Inclusion Criteria

Pregnant nulliparous women aged 18-40 years, with singleton gestation, in vertex presentation, with spontaneous labor, in active phase of labor (cervical dilatation ≥6cm) at gestational age of 36 to 41 weeks.

3.4.2 Exclusion Criteria

The following women were excluded from the study:

1. Multiparous parturient
2. Preexisting medical conditions such as diabetes mellitus, hypertension, renal disease, liver disease, cardiac disease
3. Contraindications (relative or absolute) to spontaneous vaginal delivery such as malpresentation, multiple gestation, chorioamnionitis at admission, intra-uterine growth restriction (<10th percentile), macrosomic fetus (ultrasound estimated fetal weight > 4kg), non-caesarean uterine scar (myomectomy scar)
4. Patients admitted for induction of labor

3.5 Sample Size Determination

The main outcome of this study is a reduction in the duration of active phase of labor among participants who received an infusion of 175ml/hour of 5% dextrose – normal saline compared to those who received 175ml/hour infusion of normal saline only. The following assumptions were considered in this study; adapted from a similar study by Eslamian et al (33)

1. 8.1% of participants who received 250ml/hour of 5% dextrose in normal saline had active phase of labor lasting more than 10hours
2. 20.4% of participants who received 250ml/hour of normal saline infusion had active phase of labor lasting more than 10 hours
3. These outcomes were statistically significant (p=0.001) at a level of significance of 5% and power of 80%.

In this study, we postulated that the frequency of active labor lasting more than 5hours would be higher among women receiving 175ml/hour of normal saline compared to those that will receive 175ml/hour of 5% dextrose – normal saline solution. Therefore for us to detect 12.3% difference in among participants with better outcomes, we estimated using the sample size formula: [Allan Donner; Stat. Medicine (1984)

Using the statcalc software a total of **99** women per study arm to achieve 80% power to detect the stated difference of 12.3% at a one-sided alpha=0.05 level of significance were enrolled. Where = $(p_C + p_a)/2$ (=1.960, and =0.842)

3.6 Sampling Procedure

Participants, caregivers and those assessing the outcomes were blinded to group assignment. Based on simple randomization, participants were assigned to receive either 175 mL/hour of

normal saline or 175mL/hour of 5%dextrose in normal saline for the whole duration of labor and delivery.

3.7 Study Procedures

3.7.1 Recruitment and Consent

All women who sought delivery services at KNH were informed about the study by the triage nurse. Those who met the inclusion criteria were provided with individualized information about the study. The decision to include the women in the study was made after ascertaining gestational age (extrapolating from Last normal menstrual period, by earliest available obstetric scan), examination and ascertaining that they were in labor with a cervical dilatation of at least 5 cm. This was done by the research assistants/principal investigator from the antenatal cubicles at the bed side.

The informed consent was then administered to the eligible women, in either Swahili or English language and those who consented to the study, signed the consent form. This was countersigned by the principal investigator or research assistant. Any pertinent questions regarding the study from the patient were answered at this point. The process of consenting was free from coercion and was purely voluntary.

Withdrawal from the study was allowed at any stage without any negative consequences, and reasons for the withdrawal were to be documented. No participant dropped out of the study.

3.7.2 Randomization

As noted above, the study participants were selected through convenience sampling from the eligible pregnant women admitted to the hospital for delivery. Following the signing of the informed consent form by the recruited women, the participants were randomly assigned into control and intervention groups in a ratio of 1:1 using simple random sampling technique. A

randomization list for allocations to the each of the study arms was created prior to the commencement of the study. This list was in the custody of the principal investigator, and was used to generate unique numbers that were used to randomly identify subjects during the study.

3.7.3 Blinding procedure

The study was a randomized controlled double blinded study. In order to conceal the type of intra venous fluid given to the participant, the following steps were taken:-

1) An independent person (not privy to the study) peeled off the labels on all bottles and removed the plastic caps as well. This left all bottles looking the same (clear plastic bottle) irrespective of the type of intravenous fluid.
2) With the maximum intended infusion volume per participant estimated at 2000ml (i.e. 4 bottles each containing 500ml), the plastic bottles containing were assigned a code (by the aforementioned individual) corresponding to the participant's number .e.g. Bottles labelled from 001A, 001B, 001C and 001D up to 198A, 198B, 198C, 198D were assigned to participants with code number 001. N/B: all four bottles had the same type of intravenous fluid e.g. Normal saline or Dextrose 5% in normal saline. i.e.
3) These coded bottles of intravenous fluids were then arranged (by the same individual) in a systematic order in carton boxes to ensure ease of dispensation to the primary midwife/ doctor when need arises. The above mentioned individual was instructed NOT to divulge any information regarding the blinding procedure to anyone involved

in the study (primary investigator, research assistants, midwives and doctors in labor ward).

4) Dispensation was carried out by the primary investigator or research assistant(s) who kept a log of fluids (number of bottles) dispensed to any participant, including keeping record(s) of which participant ended up crossing over in the study (switching from dextrose 5% in normal saline to plain normal saline).

3.7.4 Study Interventions

Before commencing the study, a meeting was scheduled in the KNH maternity unit to educate the health care attendants on the protocol, assess their understanding of its procedures, and assess whether they were able to carry out the required procedures. This sensitization program involved the midwives and senior housing officers and also entailed placement of appropriate posters about the study in the maternity unit.

All the study participants went through the triage area, where the triage nurses (or clinician) checked their vital signs (blood pressure, heart rate, weight and height), counterchecked the ante natal profile parameters and request for any missing antenatal tests. This was followed by a preliminary physical and obstetrics examination. In addition, the triage nurse informed the women about the study and the inclusion criteria. Once identified to be in labor, and upon receiving verbal consent for a repeat obstetric examination, the triaging nurse informed the research assistant or principal investigator to confirm the findings and administer a consent form for signing before proceeding with the admission process. NB: A random blood sugar test was carried out before consent is given (to screen for hyperglycemia). Women who were in the latent phase of labor, but eligible to participate in the study, were allowed to progress with the admission process with a plan to monitor labor as per the KNH protocols and to initiate IVF once in active phase of labor (cervical dilatation ≥5cm); those who were already

in active phase of labor at the time of admission(confirmed by the research assistant and PI) , had an informed consent administered and IVF initiated alongside routine intra-partum care as per KNH protocols.

The participants were randomized to receive either 175ml/hour of normal saline or 175ml/hour of 5% dextrose – normal saline infusion. This was followed by insertion of the intravenous fluid administration needles/cannullae (gauge 18).

Calculation of the drop rate per min (using a routine IV set):

Drop rate = Volume (mL/hour)/4 i.e. (175ml/hour)/4

= **43.75 drops/min**

Targeted infusion rate = 175ml/hour

1ml = 15 drops therefore 175mls = 2,625 drops

1 hour (60 min) = 2,625 drops

Therefore 1 minute = 43.75 drops

The infusion of the intravenous fluids was monitored by the principal investigator or research assistants to ensure the desired infusion rate was adhered to.

The prepackaged IVF were stored at room temperature in a secure location within the KNH Labor Ward; the keys to the lockable cabinet were in the custody of the labor ward in charge. Identical infusion sets and intravenous infusion needles were used and also kept in a lockable cabinet. For purposes of quality control all IV fluids were ordered from the same pharmaceutical company and bore the same batch number.

All other labor and delivery interventions were carried out as per the KNH standard operating procedure with both arms of the study receiving similar management of labor, delivery and immediate post-partum care as follows:

a. **Monitoring of Active Phase of Labor (vaginal examination done every4 hours, or shorter – at the discretion of the attending clinician)**
    - Regular evacuation of the bladder
    - Allow unlimited oral intake of food and water
    - Participants were allowed to pace around the bedside as the labor progresses
    - If rest was needed, the participant was nursed in her left lateral position
    - Partogram (pulse rate every 30minutes, blood pressure monitoring every 2 hours, temperature monitoring every 4 hours, monitoring of the uterine contractions every 30minutes, cervical dilatation assessment every 4 hours, fluid input and output monitoring, and monitoring of drugs such as oxytocin)
    - Amniotomy, oxytocin augmentation or conscious use of plain normal saline(in case of non-reassuring fetal status) were at the discretion of the attending physician

N/B: For participants with atypical progression of labor and/ or had an indication for delivery via caesarian section, the study IVF would be discontinued and appropriate pre-operative care initiated. Their participation in the study would end upon delivery of the fetus.

b. **Monitoring of Second Stage of Labor (vaginal examination every 30minutes)**
    - Patient transferred to the delivery suit and placed in lithotomy position
    - Cleaning of the lower abdomen, upper parts of the thighs, vulva and perineum (using antiseptic solution routinely availed in KNH)
    - Application of sterile towels

- Fluids administered as per the study protocols
- Support of the perineum and guiding the patient through the delivery process

c. Monitoring of the Third Stage of Labor

- Routine prophylactic intramuscular injection of 10 IU oxytocin at delivery of the anterior shoulder or within 2 min of birth
- Manual removal of the placenta at 30 min after birth if not spontaneously expelled.
- Rapid suturing of episiotomy(if given)
- Management of any postpartum complications such as postpartum hemorrhage
- Support of the baby after delivery: APGAR scoring, Cord clamping, resuscitation as appropriate

The primary investigator was not involved in the process of delivery or the subsequent management and was only involved in monitoring the adequacy of the fluid infusion as per the study protocol. However, any observable deviation of the normal process of labor that necessitated intervention was communicated to the senior house officer or primary mid wife. In addition, the research assistant/principal investigator closely monitored participants for the side effects to the administration of the IVF such as fluid over load, anaphylactic reactions or fluid extravasation.

No adverse events were noted during the entire period of the study

3.7.5 Data Collection Tools

The following tools were used:-

a) Questionnaire – to collect the biodata and relevant medical information about the participant
b) Partograph – to assess the course of labor(length of labor; need for augmentation of labor ; mode of delivery)
c) APGAR score – to assess neonatal outcome

3.7.6 Premature discontinuation of fluid

For patients who had atypical progression of labor (prolonged labor, delayed second stage of labor) or non-reassuring fetal status (e.g. fetal tachycardia, fetal bradycardia, irregular fetal cardiac rhythm, meconium stained liquor, non-reactive cardiotocogram) or had an indication for delivery via caesarian section (e.g. ante-partum bleeding):- they were adequately prepared and taken to theater for emergency delivery. At this point, the intravenous fluid assigned to the participant was stopped, and Normal saline infusion (with manfacturer's label on) initiated at the discretion of the attending clinician on duty, as per hospital protocols for the condition at hand.

3.8 Ethical Considerations

Approval was sought from the KNH and UON Ethics Research Committee (ERC) and the management of KNH to carry out this study as part of the UON thesis dissertation. Posters explaining the study procedure were placed at strategic places in the maternity unit at the KNH. A meeting was held to sensitize the nurse-midwives about the study protocol and potential side effects of the study.

All the study participants were subjected to an "opt out" consenting procedure, and were only enrolled upon voluntarily signing the consent form. The procedure for insertion of the IV needle was explained to the participants by the PI or research assistant, both in groups, and individually during the individual consenting process. No pain management medications

were provided during the process and insertion was done by the research assistant (a practicing midwife) or the principal investigator.

The participant's names and other bio data were de-identified by use of an assigned unique identifier, only applicable to the study. This coded information was uploaded to the excel sheet and password protected. Back up data was kept in a password encrypted external hard drive, only known to the PI.

Need for quality assurance necessitated repeat vaginal examination by designated person (principal investigator/research assistant) to confirm cervical dilatation at the point of admission before enrollment into the study; predisposing the participant to increased risk of genital tract infection. This risk was mitigated by adhering to strict aseptic techniques of vulval toileting/ vaginal examination.

In the event of any adverse reaction during the study, the senior house officer was to be alerted immediately for subsequent management. This would be reported using the adverse events reporting tool in the annex and shared with the KNH-UoN ERC.

This eventuality was documented on the questionnaire with attending reason for discontinuation of the coded fluid. If no complication arose, all participants (unless one opted out of the study) were followed to the point of vaginal delivery .Participant follow up (for either arm of the study) essentially ended upon delivery of the fetus.

3.9 Data Collection Procedures

3.9.1 Data Variables

Pregnancy outcomes were measured by length of active phase of labor, length of second stage of labor, need for augmentation of labor with oxytocin, mode of delivery and APGAR score as shown in the table below:

Objectives	Exposure Variables	Outcome Variables	Source of Data
Describe Socio-Demographic Characteristics of The Study Participants	1. Age 2. Gestational Age	1. Length Of Labor 2. Pregnancy Outcomes	1. Patient File 2. Antenatal Record 3. Direct Interview Of Participant
To Compare The Effect Of Intra-partum Normal Saline Infusion And Dextrose 5% In Normal Saline, On The Length Of Labor	1. Intra-partum Normal Saline Infusion 2. Intra-partum Dextrose 5% In Normal Saline	1. Length active phase, 1st stage of labor 2. Length Of Second Stage Of Labor 3. Total Length Of Labor	Patient File
To Compare The Effect Of Intra-partum Normal Saline Infusion And Dextrose 5% In Normal Saline, on need for augmentation	1. Intra-partum Normal Saline Infusion Intra-partum Dextrose 5% In Normal Saline	Augmentation of labor with oxytocin	
To Compare The Effect Of Intra-partum Normal Saline Infusion And Dextrose 5% In Normal Saline, On mode of delivery and Pregnancy Outcomes	2. Intra-partum Normal Saline Infusion 3. Intra-partum Dextrose 5% In Normal Saline	1. Mode of delivery 2. APGAR score	Patient file

3.9.2 Study Materials

The following equipment/supplies were used in the study:

1. Stationery – Questionnaires, pens, watches

2. Hospital equipment – Sterile gloves; Vaginal examination packs (containing sterile gauze/cotton for vulvar cleaning before examination); Normal saline infusion and dextrose 5% in normal saline (half liter bottles/packs); intravenous infusion sets (calibrated); Fetoscopes /hand held Doppler machines for fetal cardiac activity monitoring; Glucometer and strips;

3.9.3 Quality Assurance

After ethical approval, questionnaires were pre-tested and analyzed before a final draft was administered to the study participants. In addition, the principal investigator enlisted the service of research assistants drawn from the midwives at the KNH maternity unit and with a training in good clinic practice and experience in data collection to conduct data collection. They were trained on confidentiality, interviewing, information retrieval and filling the questionnaire.

The principal investigator ensured regular monitoring and supervision of the research assistants during data collection. 10% of the completed questionnaires were manually checked against the primary data source to confirm data accuracy.

All intravenous fluids used were sourced from the same company; had similar packaging bottles and bore the same batch number.

All participant data did not bear the names of the participants but a serial number. Filled questionnaires were kept in a secure lockable cabinet only accessible by the principal investigator and research data manager. A data manager cleaned, coded and entered the data into a password protected MS excel database before data analysis.

2.18 Data Analysis Plan

Data was collected using specially designed data collection questionnaires. This was done by the principal investigator or the trained research assistants. The collected data was verified by the principal investigator on a daily basis before uploading to a password protected excel sheet for data cleaning before analysis using the SPSS version 23 software.

An intention to treat approach was used to analyze the data, using Stata V12 software. Socio-demographic characteristics of the participants such as age, parity, level of education presented in form of tables and pie charts. A comparison of the socio demographic and clinical characteristics between the two groups, those on normal saline and those on DNS was done. Maternal and neonatal outcomes were compared between the two groups using bivariate analysis. A p value of 0.05 was taken to be significant statistically.

CHAPTER FOUR: RESULTS

The study was designed to include a total of 198 women (99 women per arm) and to detect a statistically significant difference in the duration of active phase of labour among patients receiving 175ml/hr of 5% dextrose in normal saline compared to those receiving 175ml/hr normal saline infusion during labour, with an 80% power and a p value of 0.05.

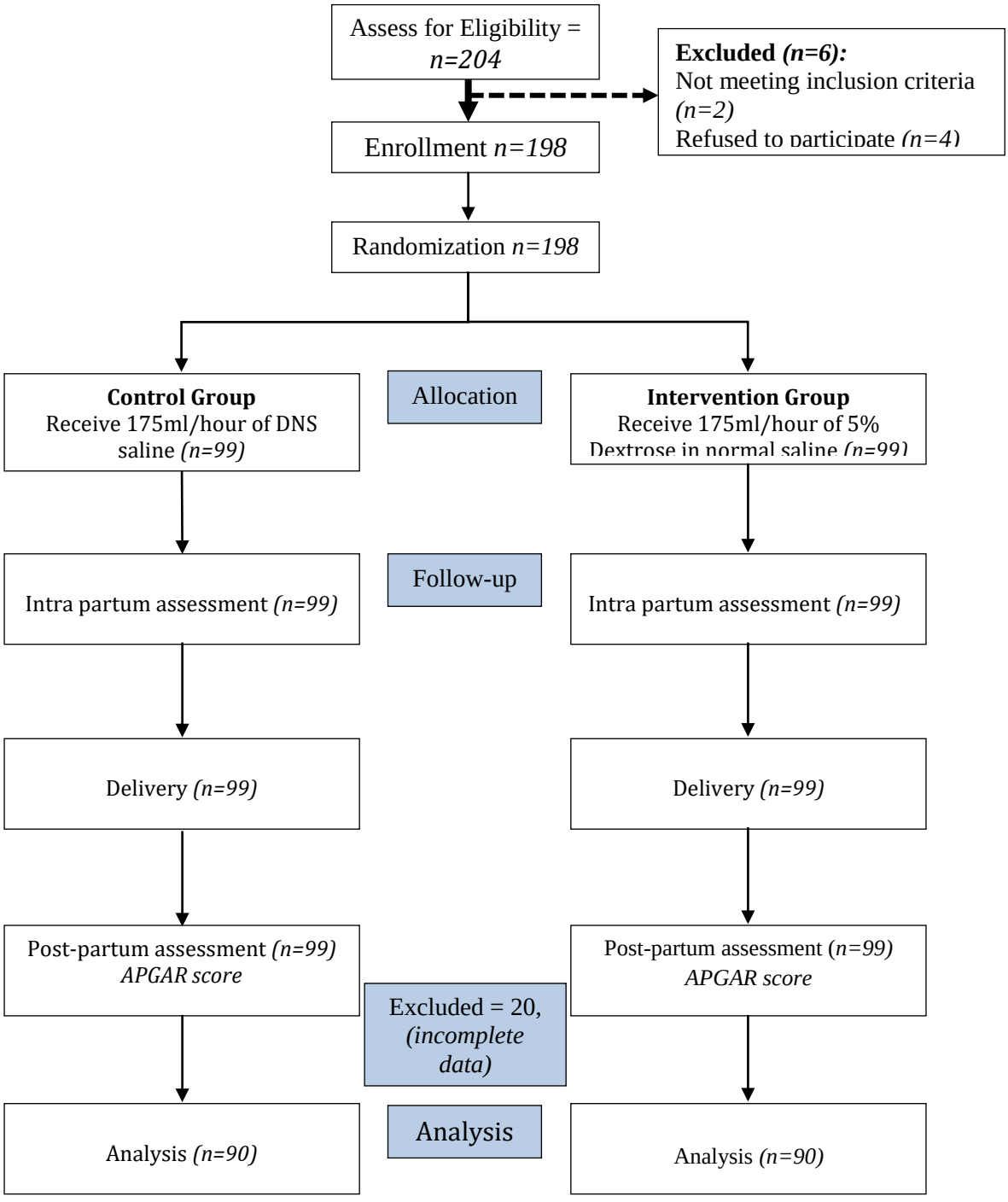


Figure1. Participant Flowchart

A total of 99 questionnaires per arm were administered but 16 questionnaires had irregularities (7 of the 5%DNS group and 9 of the NS group), thus to maintain equality across the groups, 90 per arm (91%) were analysed using SPSS version 23 as per the study flow diagram **(Figure1).**

The socio demographic characteristics of the study participants was analyzed and found to be similar. (Table 1). The mean age for the study population was 22.71 years (SD 3.5); there was no statistical difference in the participants' ages across the two groups (5% DNS, 22.53, sd 3.53; NS, 22.89, sd 3.57: p, 0.97). The mean gestation age did not differ significantly between the two groups (5% DNS, 39 weeks, sd 1.33; NS 39.06, sd 1.9; p, 0.49). The mean blood sugar between the two groups was comparable (5% DNS, 5.58, sd 0.79; NS 5.46, sd 0.75; p 0.07)

Table1: Demographic and clinical characteristics in intervention arm and Control groups

Variable	**5% DNS(n=90)**	**NS (n=90)**	**P value**
Mother's age, in years (Mean, sd)	22.72 (3.53)	22.72 (3.57)	0.97
Gestation age, in weeks (Mean, sd)	39 (1.33)	39.06 (1.9)	0.49
Maternal RBS, in mmol/l (Mean, sd)	5.58 (0.79)	5.45 (0.75)	0.43

5%DNS – 5% Dextrose in Normal Saline, NS- Normal Saline, RBS – Random blood sugar

The cumulative need to stop administration of the coded IV fluid was 95 (52.8%): 49 (54.4%) for the NS group and 46 (51.1%) for the 5% DNS group. It was 1.14 times more likely to have the fluids stopped if in the 5%DNS group compared to when in the NS group (OR, 1.14, 95% CI 0.64-2.05), p=0.654. This finding was however not significant statistically.

Table2: Comparison of cumulative need to prematurely discontinue coded Intravenous fluid between intervention arm and Control groups

		TOTAL	5% DNS (%) (n=49)	NS (%) (n=46)	Odds Ratio (95% CI)	P value
Stopping of fluid administration	Yes	95	49 (54.4)	46 (51.1)	1.14 (0.64-2.05)	0.654
	No	85	41 (45.6)	44 (48.9)		

5%DNS – 5% Dextrose in Normal Saline, NS- Normal Saline

The indications for stopping fluid administration among the 49 participants in the 5% DNS group, 32 (65.3%) was due to oxytocin augmentation, 7 (14.3%) due to non-reassuring fetal status while 10 (20.4%) was due to the need for Cesarean delivery. Similarly, in the NS group that needed fluids to be stopped, 23 (50%) was due to augmentation of labor with oxytocin, 5 (10.9%) due to non-reassuring fetal status while 18 (39.1%) due to emergency Cesarean delivery.

Table3: Comparison of reasons for prematurely discontinuing coded intravenous fluid between Intervention arm and Control groups

Indication for stopping fluid infusion	5% DNS, n=49	NS, n=46
Oxytocin Infusion	32 (65.3%)	23 (50%)
Non Reassuring Fetal Status	07 (14.3%)	05 (10.9%)
Emergency Cesarean Section	10 (20.4%)	18 (39.1%)

5%DNS – 5% Dextrose in Normal Saline, NS- Normal Saline

The most common cervical dilation at presentation was 5 cm (25%); this was the same across the two groups.

Mean duration for active phase of labor was lower among the 5% DNS group (5.73hrs, sd 2.25) compared to the NS group (5.94, sd 2.66); this was not however significant statiscally (p=0.268).

Further categorization of the data was done to assess the impact of the fluids on active and 2nd stage of labor. In order to compare the effect of intra-partum normal saline infusion and dextrose 5% in normal saline, on the length of labor, the data was categorized into prolonged labor (lasting more than 5 hours or not prolonged, lasting ≤5 hours). Table 2 below shows that patients in the 5% DNS group were 18% less likely to have active phase of labor lasting more than 5hours compared to the ones on NS. This was however not significant statistically.

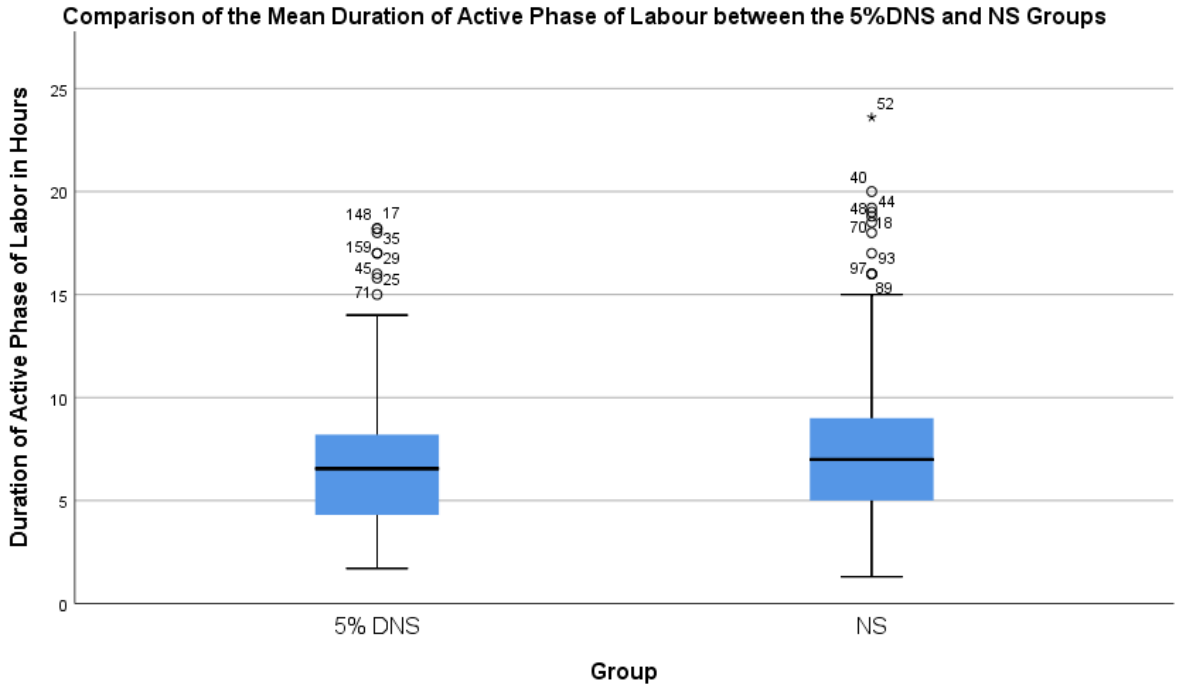


Figure 2: Boxplot comparing mean duration of active phase of labor between 5% DNS and NS groups

Mean duration of second stage among women who delivered via SVD was lower in the 5% DNS (26min) group compared to those in the NS group (37min); this difference was statistically significant, p=0.015

Table 4: Comparison of 2nd stage of labor across the 5%DNS group compared to the NS group

Group	Frequency	Mean	Std dev.	P value
5% DNS	66	0.43 (26min)	0.30	0.015
NS	75	0.62 (37min)	0.58	

5%DNS – 5% Dextrose in Normal Saline, NS- Normal Saline

In order to compare the need for augmentation of labor with oxytocin across the two groups, it was noted that oxytocin was needed in a total of 55 participants, 32 (58.2%) and 23 (41.8%) from the NS group. Participants who were randomized in the 5% DNS group were x2 more likely to have augmentation of their labour with syntocinon (OR 1.88, 95% CI 0.82-4.29, p=0.13). This was not significant statistically.

Table 5: Comparison of need for augmentation of labor with oxytocin use

		5% DNS(n=90)	NS (%) (n=90)	Odds Ratio (95% CI)	P value
Snytocinon use	Yes	32 (63.5)	23 (50)	1.88	0.13
	No	17 (36.5)	23 (50)	(0.82-4.29)	

5%DNS – 5% Dextrose in Normal Saline, NS- Normal Saline

To compare the effect of intra-partum normal saline infusion and dextrose 5% in normal saline, on pregnancy outcomes (maternal and fetal/neonatal). A bivariable statistical model was constructed for the outcomes (SVD vs cesarean delivery and Apgar score of less than 7 vs more than 7) and the Chi Square test (mode of delivery) and Fishers test (for Apgar score) used to compare the outcomes between the two groups as shown below (Table 4).

Table 6: Comparison of mode of delivery and neonatal outcomes between Intervention arm and Control groups

	Variable	Interventional arm (5% DNS) (n=90)	Control group (NS) (n=90)	Odds Ratio (CI)	P Value
Mode of Delivery	C S	19 (21.1)	25 (27.8)	0.696	0.298
	SVD	71 (78.9)	65 (72.2)	(0.35-1.38)	
APGAR Score	Less than 7	1 (1.1)	9 (10)	0.101	0.018
	More than 7	89 (98.9)	81 (90)	(0.013-0.816)	

Participants who received 5%DNS were 31% less likely to undergo cesarean delivery compared to those who were initiated on DNS (OR, 0.696, p, 0.298); the association was however not significant statistically.

Despite the values being too small to make any meaningful deduction on the association of the type of fluid and the APGAR Score, the study findings indicated a 90% less likelihood of the neonate scoring an apgar score of more than 7 at 5minutes compared to those in the NS group (OR, 0.101, p,0.018).

CHAPTER FIVE: DISCUSSION

In this study we observed that intra-partum supplementation of dextrose containing intravenous fluid caused a reduction in the length of active phase of labor, but this was not statistically significant (p = 0.236); Neither did it significantly reduce the need for cesarean delivery (p= 0.298).Duration of second stage of labor was comparable between the groups with a mean duration of 45 minutes.

The study findings indicated a 9 times odds (OR, 9.0) for a participant to have their new born child with a worse APGAR score (<7 at 5 min) when on NS as compared to 5%DNS (p=0.018).

Save for the difference in duration of second stage of labor and neonatal outcomes between use of NS and DNS, the rest of the findings in this study were in keeping with those noted in a clinical trial by Alex Fong et al who enrolled 274 women and assigned them to 3 groups (NS at 250ml/hour; 5%DNS at 125ml/hour; 5%DNS at 250ml/hour).(33) They noted no difference in total length of labor, cesarean delivery rates or neonatal outcomes.

A total of 55 participants received syntocinon for augmentation of labor - 32 (58.2%) from the DNS group and 23 (41.8%) from the NS group. Participants who were randomized in the 5% DNS group were twice more likely to have augmentation of their labour with syntocinon (OR 1.88, 95% CI 0.82-4.29, p=0.13). This was not significant statistically.

Movahed et al similarly noted no significant difference in need for augmentation of labor nor APGAR score between the Normal Saline and Dextrose in saline groups. (34)

These observations however, contradict several previous studies that noted a statistically significant difference in both the duration of active phase of labor and second stage of labor. Shirvastava et al enrolled 289 women in a similar study and assigned them to three groups (NS; 5%DNS; 10% DNS). (15). They observed statistically significant reduction in duration

of active phase of labor and second stage of labor (p= 0.01; 0.01). (15) A similar observation was made by Sharma et al (16)and Movahed et al (34)in later studies.

Our observation of similar cesarean rates between the two groups is in keeping with findings from past studies by Sharma et al, Shirvastva et al and Movahed et al (15,16,34), and Alex Fong as mentioned above (33)

The differences in findings on effect on duration of labor could arise from varying study procedures across different studies. Movahed et al enrolled women with at 3-5cm cervical dilatation (34), while this study used a cut off of 5cm cervical dilatation. Need for augmentation with oxytocin was set at cervical dilatation rate of <1.2cm hour) in the study by Movahed et al but in this study it was inititated at the discretion of the attending clinician and guided by hospital protocols. Vaginal examinations were done hourly and emergency cesarean section prescribed if no progress in cervical dilatation over 2hours or no progress in descent over 1 hour in the study by Movahed. In contrast, vaginal examinations were done every 4hours unless cervical dilatation was >7cm and women were allowed more time for cervical dilatation and descent as per current WHO 2018 recommendations on duration of first stage of labor. Accurate determination of onset of second stage of labor varied amongst care givers since this was dependent on self-reporting of urge to bear down by the participant. This could explain the disconnect when comparing effect of dextrose containing IV fluid on active phase and second stage of labor.

Conclusion:

Administration of intra-partum dextrose containing intravenous fluid was not significantly associated with mean duration of active phase of labor, infusion with oxytocin and Cesarean delivery. Using 5% DNS however is significantly associated with a shorter duration of second stage of labor and better APGAR scores. From the study findings, use of dextrose

containing intravenous fluid during labor does confer benefit on second stage of labor and neonatal outcomes over non-dextrose containing intravenous fluids

Study Limitations

In view of the various factors influencing the process of labor, there was likely to be confounding. To overcome this, matching for age at the point of selection of the study participants was done. In addition, patients with conditions that are likely to alter the natural progression of labor will be excluded from the study.

Concurrent per oral intake of food and fluids might have affected the course of labor and in turn, neonatal outcomes, since the caloric intake / amount of hydration could not be accurately accounted for.

Due to lack of a standard protocol for monitoring of patients in labor with variabilities in using the partogram and the tocograms, there is a likelihood of slight variations in the decision making e.g. augmentation of labor with oxytocin or prescription of cesarean delivery for prolonged labor. To mitigate this, the research assistants undertook training in assessment of cervical dilatation (on models) and correct use of partogram before rolling out the study, and followed up participants as the primary care givers to ensure standardization of management across the two groups.

Cervical response to spontaneous or oxytocin-induced contractions of the uterus differs in different people. The full assessment of individual differences such as pelvis shape and pelvic soft tissues and their resistance against the passage of the fetus is impossible; however, the researchers sought to overcome these limitations by randomly assigning their participants to the two study groups.

Ascertaining true duration of second stage of labor was not possible since it was not feasible to determine when a patient actually got to full dilatation. The research assistants/ PI primarily depended on a participant reporting the urge to bear down or incidental finding of full cervical dilatation during a routine/ scheduled vaginal examination.

Lastly, due to the differences in pain perception across different patients, the response to labor pains during the active phase of labor may lead to altered understanding and response to the consenting process, with a false perception that participating in the study may help reduce the pain. This was overcome by discussing the study interventions with the patients while in the less painful latent phase of labor, at which point there was minimal influence of the pain to the sense of judgment.

Study Closure and Results Dissemination Plan

Data analysis and presentation of the results were made to the department of obstetrics and gynecology, University of Nairobi for input from the faculty and as part of the fulfillment of the master in Obstetrics and Gynecology. Following the revisions by both the internal and external examiners, the findings will be disseminated to the Obstetrics and Gynecology Department, KNH and a report submitted to the KNH-UoN Ethics and Research Committee. It will also be submitted for publications of manuscripts in journals and abstract presentations in conferences

REFERENCES

1. ACOG COMMITTEE OPINION 2019. ACOG Committee Opinion No. 766 Summary. Obstet Gynecol. 2019 Feb;133(2):406–8.
2. Dawood F, Quenby S. Intravenous fluids for preventing dehydration and prolonged labour in nulliparous women. In: Dawood F, editor. Cochrane Database of Systematic Reviews. Chichester, UK: John Wiley & Sons, Ltd; 2009.
3. Saeedi M, hajseyedjavadi houman, shamsvahdati samad, eslami vahid, mokhtarpour mohamad, momeni mahdi, et al. Hypertonic, Normal Saline or Neither: Which One is better in Uncontrolled Hemorrhagic Shock? Experimental Study on Goat. Turkish J Trauma Emerg Surg. 2013;19(6):500–6.
4. Sehhatie Shafaie F, Mohaddesi H, Mirghafourvand M, Ahadi Yulghunlu F. A Randomized, Double-Blinded, Controlled Trial Comparing Parenteral Dextrose 5%, Ringer's Solution and Oral Intake on the Delivery Outcomes in Nulliparas. Int J Women's Heal Reprod Sci. 2017 Mar 8;5(4):283–9.
5. Handa V L, Harpreet K P et al. Architectural differences in the bony pelvis of women with and without pelvic floor disorders. Obstet Gynecol. 2003;102(6):1283–90.
6. Shephard RJ. American College of Sports Medicine Position Stand: Exercise and Fluid Replacement. Yearb Sport Med. 2007 Jan;2007(June 2015):254–5.
7. Xiaocai ShiCarl V. Gisolfi. Fluid and Carbohydrate Replacement During Intermittent Exercise. Sport Med. 1998;25(3):157–72.
8. Pierce J, Francisco L G et al. Intrapartum amnioinfusion for meconium-stained fluid: meta-analysis of prospective clinical trials. Obstet Gynecol. 2000;95(6):1051–6.
9. Watanabe T, Minakami H et al. Effect of labor on maternal dehydration, starvation,

coagulation, and fibrinolysis. J Perinat Med. 2005;29(6).

10. Meeting D. June 2017. Vol. 22, ASHA Leader. 2017. 20 p.

11. Mamede AC, Carvalho MJ, Abrantes AM, Laranjo M, Maia CJ BM. Amniotic membrane: from structure and functions to clinical applications. Cell Tissue Res. 349(2):447–58.

12. Beard R, Stucki A, Schmitt M, Py G, Grundschober C, Gee AD, et al. Building bridges for highly selective, potent and stable oxytocin and vasopressin analogs. Bioorganic Med Chem. 2018;26(11):3039–45.

13. The Lancet. Stemming the global caesarean section epidemic. Lancet. 2018 Oct;392(10155):1279.

14. Ministry of Health Republic of Kenya. Statistical Review of Progress Towards the Mid-Term Targets of the Kenyan Health Sector Srategic Plan. Minist Heal Repub Kenya. 2014;

15. Shrivastava V, Garite T, Jenkins S, Saul L, Rumney P, Preslicka C, et al. 36: A double-blinded randomized controlled trial comparing normal saline with and without dextrose on the course of labor in nulliparas. Am J Obstet Gynecol. 2007;

16. Sharma C, Kalra J, Bagga R, Kumar P. A randomized controlled trial comparing parenteral normal saline with and without 5 % dextrose on the course of labor in nulliparous women. Arch Gynecol Obstet [Internet]. 2012 Dec 4;286(6):1425–30. Available from: http://link.springer.com/10.1007/s00404-012-2485-1

17. Finlayson K, Downe S, Vogel JP, Oladapo OT. What matters to women and healthcare providers in relation to interventions for the prevention of postpartum haemorrhage: A qualitative systematic review. PLoS One. 2019;

18. Downe S, Finlayson K, Oladapo O, Bonet M, Gülmezoglu AM. What matters to women during childbirth: A systematic qualitative review. PLoS ONE. 2018.

19. Dawood F, Dowswell T, Quenby S. Intravenous fluids for reducing the duration of labour in low risk nulliparous women. Cochrane Database Syst Rev. 2013 Jun 18;
20. Direkvand-Moghadam A, Rezaeian M. Increased intravenous hydration of nulliparas in labor. Int J Gynecol Obstet. 2012;
21. Kavitha A, Chacko KP, Thomas E, Rathore S, Christoper S, Biswas B, et al. A randomized controlled trial to study the effect of IV hydration on the duration of labor in nulliparous women. Arch Gynecol Obstet. 2012 Feb 12;285(2):343–6.
22. Shrivastava VK, Garite TJ, Jenkins SM, Saul L, Rumney P, Preslicka C, et al. A randomized, double-blinded, controlled trial comparing parenteral normal saline with and without dextrose on the course of labor in nulliparas. Am J Obstet Gynecol [Internet]. 2009 Apr;200(4):379.e1-379.e6. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0002937808022503
23. Ehsanipoor RM, Saccone G, Seligman NS, Pierce-Williams RAM, Ciardulli A, Berghella V. Intravenous fluid rate for reduction of cesarean delivery rate in nulliparous women: a systematic review and meta-analysis. Acta Obstet Gynecol Scand. 2017 Jul;96(7):804–11.
24. Fong A, Allison E et al. A randomized, double-blinded, controlled trial of the effects of fluid rate and/or presence of dextrose in intravenous fluids on the labor course of nulliparas. Am J Obstet Gynecol. 2017;217(2):208.1l-208.e7.
25. Ehsanipoor RM, Saccone G, Seligman NS, Pierce-Williams RAM, Ciardulli A, Berghella V. Intravenous fluid rate for reduction of cesarean delivery rate in nulliparous women: a systematic review and meta-analysis. Acta Obstet Gynecol Scand. 2017 Jul;96(7):804–11.
26. Ghonemy GE. The Impact of Intravenous Protocols During Labor on Maternal \ Newborn Outcomes. SOJ Nurs Heal Care. 2017 Apr 14;3(1):1–9.

27. Coco A, Derksen-Schrock A, Coco K, Raff T, Horst M, Hussar E. A randomized trial of increased intravenous hydration in labor when oral fluid is unrestricted. Fam Med. 2010;

28. Edwards R, Reed C, Villano K, Holmes J, Tong S, Davies J. Effect of Hydration on Spontaneous Labor Outcomes in Nulliparous Pregnant Women: A Multicenter Randomized Controlled Trial Comparing Three Methods. Am J Perinatol. 2013 Jul 24;31(06):455–62.

29. Garite TJ, Weeks J, Peters-Phair K, Pattillo C, Brewster WR. A randomized controlled trial of the effect of increased intravenous hydration on the course of labor in nulliparous women. Am J Obstet Gynecol. 2000;

30. Watson J, Hodnett E, Armson BA, Davies B, Watt-Watson J. A Randomized Controlled Trial of the Effect of Intrapartum Intravenous Fluid Management on Breastfed Newborn Weight Loss. J Obstet Gynecol Neonatal Nurs. 2012 Jan;41(1):24–32.

31. Chantry CJ, Nommsen-Rivers LA, Peerson JM, Cohen RJ, Dewey KG. Excess Weight Loss in First-Born Breastfed Newborns Relates to Maternal Intrapartum Fluid Balance. Pediatrics. 2010;

32. Noel-Weiss J, Woodend AK, Peterson WE, Gibb W, Groll DL. An observational study of associations among maternal fluids during parturition, neonatal output, and breastfed newborn weight loss. Int Breastfeed J. 2011;6(1):9.

33. Riegel M, Quist-Nelson J, Saccone G, Locci M, Shrivastava VK, Salim R, et al. Dextrose intravenous fluid therapy in labor reduces the length of the first stage of labor. Eur J Obstet Gynecol Reprod Biol [Internet]. 2018 Sep;228:284–94. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0301211518303464

34. Movahed F, Pakniat H, Ataee M, Barikani A, Jamsi L. Normal Saline and Dextrose-

Saline Infusion Comparison in the Duration of Active Phase in Nulliparous Women. Biotechnol Heal Sci [Internet]. 2015 Nov 23;2(4). Available from: http://biotech-health.neoscriber.org/en/articles/21441.html

ANNEXES

Annex 1: Consent Forms (English & Swahili)

ENGLISH CONSENT FORM

KNH- UoN ERC PARTICIPATION INFORMAION AND CONSENT FORM

ADULT CONSENT FORM FOR ENROLLMENT INTO THE STUDY

Title of Study: EFFECT OF INTRAPARTUM NORMAL SALINE AND DEXTROSE-SALINE INFUSION ON LABOR LENGTH AND PREGNANCY OUTCOMES AMONG NULLIPAROUS WOMEN IN KENYATTA NATIONAL HOSPITAL

(A RANDOMIZED DOUBLE BLINDED CONTROLLED TRIAL)

Principal Investigator\and institutional affiliation:

DR. IRENE MOKEIRA OYARO - UNIVERSITY of NAIROBI

Co-Investigators and institutional affiliation:

PROF. OMONDI OGUTU – UNIVERSITY of NAIROBI

DR. ANN KIHARA - UNIVERSITY of NAIROBI

DR. OWENDE PHILOMENA - UNIVERSITY of NAIROBI

DR. BOSIRE ALEX - UNIVERSITY of NAIROBI

Introduction: I would like to tell you about a study being conducted by the above listed researchers. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be a participant in the study. Feel free to ask any questions about the purpose of the research, what happens if you participate in the study, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions to your satisfaction, you may decide to be in the study or not. This process is called 'informed consent'. Once you understand and agree to be in the study, I will request you to sign your name on this form. You should understand the general principles which apply to all participants in a medical research: i) Your decision to participate is entirely voluntary ii) You may withdraw from the study at any time without necessarily giving a reason for your withdrawal iii) Refusal to participate in the research will not affect the services you are entitled to in this health facility or other facilities. We will give you a copy of this form for your records. May I continue? YES / NO This study has approval by The Kenyatta National Hospital-University of Nairobi Ethics and Research Committee protocol No. _____

WHAT IS THIS STUDY ABOUT?

The researchers listed above are interviewing individuals who ***are first time mothers , in labor(without needing any medication to cause labor to start).*** The purpose of the interview is to find out ***the effect of different types of intravenous fluids on the progress and outcomes of labor.*** Participants in this research study will be asked questions about ***their pregnancy and other related health concerns.*** Participants will also have the choice to undergo test such as _____. There will be approximately ***two hundred and twenty (220)*** participants in this study randomly chosen. We are asking for your consent to consider participating in this study.

WHAT WILL HAPPEN IF YOU DECIDE TO BE IN THIS RESEARCH STUDY?

If you agree to participate in this study, the following things will happen: You will be interviewed by a trained interviewer in a private area where you feel comfortable answering questions. The interview will last approximately ***ten (10) minutes***. The interview will cover topics such as ***how you have been during the pregnancy, whether you attended antenatal clinics, whether you have any underlying illness or allergies, whether you have had any investigations /tests done during the pregnancy.*** After the interview has finished, ***we will check your blood glucose levels. If within normal, and you meet other expectations, you will be allowed to participate in the study*** (explain in details any procedures that are necessary e.g. blood draws, counseling etc.) We will ask for a telephone number where we can contact you if necessary. If you agree to provide your contact information, it will be used only by people working for this study and will never be shared with others. The reasons why we may need to contact you include: - ***to communicate the results of the proposed study***

ARE THERE ANY RISKS, HARMS DISCOMFORTS ASSOCIATED WITH THIS

STUDY?

Medical research has the potential to introduce psychological, social, emotional and physical risks. Effort should always be put in place to minimize the risks. One potential risk of being in the study is loss of privacy. We will keep everything you tell us as confidential as possible. We will use a code number to identify you in a password-protected computer database and will keep all of our paper records in a locked file cabinet. However, no system of protecting your confidentiality can be absolutely secure, so it is still possible that someone could find out you were in this study and could find out information about you. Also, answering questions in the interview may be uncomfortable for you. If there are any questions you do not want to answer, you can skip them. You have the right to refuse the interview or any questions asked during the interview. It may be embarrassing for you to have ***a vaginal examination by the people conducting the research, to confirm the stage of labor you might be in.*** We will do everything we can to ensure that this is done in private. Furthermore, all study staff and interviewers are professionals with special training in these examinations/interviews. Also, ***being confined to the bedside because of continuous intravenous fluid administration*** may be stressful. ***You may feel some discomfort when having the blood glucose test or having an intravenous needle inserted.*** In case of an injury, illness or complications related to this study, contact the study staff right away at the number provided at the end of this document. The study staff will treat you for minor conditions or refer you when necessary.

ARE THERE ANY BENEFITS BEING IN THIS STUDY?

You may benefit by receiving free ***blood glucose testing and non- routine intravenous fluids during the period of study***. Also, the information you provide will help us better understand ***the effect of different types of intravenous fluids on the progress and outcome***

of labor e.g. length of labor; mode of delivery; outcome of babies. This information is a contribution to science and ***hospital policies on how best to manage women in labo***

WILL BEING IN THIS STUDY COST YOU ANYTHING? (Explain)

Participation in this study will not cost you anything. All costs incurred will be incurred by the principal investigator

_____

WILL YOU GET REFUND FOR ANY MONEY SPENT AS PART OF THIS STUDY?

(Enter statement) ***No financial cost will be incurred by the participant a part of this study, hence no refund will be given to the***

participants_____

WHAT IF YOU HAVE QUESTIONS IN FUTURE?

If you have further questions or concerns about participating in this study, please call or send a text message to the study staff at the number provided at the bottom of this page. For more information about your rights as a research participant you may contact the Secretary/Chairperson, Kenyatta National Hospital-University of Nairobi Ethics and Research Committee Telephone No. 2726300 Ext. 44102 email uonknh_erc@uonbi.ac.ke. The study staff will pay you back for your charges to these numbers if the call is for study-related communication.

WHAT ARE YOUR OTHER CHOICES?

Your decision to participate in research is voluntary. You are free to decline participation in the study and you can withdraw from the study at any time without injustice or loss of any benefits.

CONSENT FORM (STATEMENT OF CONSENT)

Participant's statement I have read this consent form or had the information read to me. I have had the chance to discuss this research study with a study counselor. I have had my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand that my participation in this study is voluntary and that I may choose to withdraw any time. I freely agree to participate in this research study. I understand that all efforts will be made to keep information regarding my personal identity confidential. By signing this consent form, I have not given up any of the legal rights that I have as a participant in a research study. I agree to participate in this research study: Yes No I agree to have (define specimen) preserved for later study: Yes No I agree to provide contact information for follow-up: Yes No Participant printed name:

_____ Participant signature / Thumb stamp _____ Date _____ Researcher's statement I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has willingly and freely given his/her consent. Researcher's Name:

_____ Date: _____ Signature

_____

Role in the study: _____ [i.e. study staff who explained informed consent form.] For more information contact _____ at

_____ from _____ to

_____ Witness Printed Name (If witness is necessary, a witness is a person mutually acceptable to both the researcher and participant) Name

_____ Contact information _____

Signature /Thumb stamp: _____ Date; _____

KISWAHILI CONSENT FORM (FOMU YA IDHINI)

KNH-UoN ERC MAELEZO YA KUHUDHURIA NA FOMU YA IDHINI.

FOMU YA IDHINI YA WATU WAZIMA YA MWINGILIO KWA UTAFITI.

Kichwa cha utafiti:ATHARI YA INTRAPARTUM KAWAIDA CHUMVI NA DEXTROSE SALINE INFUSION JUU YA MATOKEO UREFU UTUNGU NA UJAUZITO MIONGONI MWA WANAWAKE NULLIPAROUS KATIKA HOSPITALI YA TAIFA YA KENYATTA.

(NASIBU MARADUFU YA KUPOFUSHA LA UDHIBITI HUKIMU)

Mkuu wa uchunguzi/Na uhusiano wa kitaasisi:

Wachunguzi shirikiano na uhusiano wa kitaasisi.

Utangulizi:

ningependa kuwafahamisha kuhusu utafiti ambao unafanyika na watafiti waliotajwa pale juu. Kina cha hii fomu ya idhini ni kuwapa maelezo mtakayohitaji yawasidie kuamua iwapo utakuwa muhusika katika utafiti au la. Kuwa na uhuru wa kuuliza maswali yoyote kuhusu nia ya utafiti, kitakachofanyika iwapo utahusika kwenye utafiti, hatari ziwezekanazo kutokea na manufaa/faida, haki zako kama mjitoleaji, na chochote kile kuhusu utafiti ama fomu hii kisichoeleweka.

Tukishajibu maswali yenu yote kwa kuridhisha/ kwa Uradhi wenu, unaezaamua kuwa katika

utafiti au la. Utaratibu huu unaitwa ‘utoaji idhini’. Mara unapoelewa na kukubali kuwa katika utafiti, nitakuomba uweke ishara jina lako kwenye fomu hii.

Unafaa kuelewa kanuni za jumla zinazotumiwa kwa washiriki wote katika utafiti wa kitiba: …) uamuzi wako kushiriki ni kujitolea kabisa …) unawez kutoka kwa utafiti wakati wowote bila kutoa sababu ya kutoka kwako….) kukataa kujiunga/kushiriki katika utafiti hakutadhuru huduma wana haki ya katika huki kituo cha afya ama vituo vingine. Tutakupatia nakala ya fomu hii kwa ajili ya kumbukumbu zako. Naezaendelea? NDIO/LA. Utafiti huu umehalalishwa na hospitali ya kitaifa ya Kenyatta- chuo kikuu cha Nairobi maadili na itifaki kamati ya utafiti nambari……

UTAFITI HUU NI WA NINI? / UNAHUSU NINI?

Watafiti walioorodheshwa hapo juu wanahoji watu ambao……. Nia ya kuhoji ni kujua ……. Washiriki katika utafiti huu wataulizwa maswali kuhusu …….. washiriki pia watakuwa na uchaguzi kwenda kupima kama ……. Kutakuwa na takriban ……. Washiriki katika utafiti huu waliochaguliwa kinasibu. Tunaomba idhini/ruhusa yako kufikiria kuhusika

NI NINI KITAFANYIKA UKIAMUA KUWA KATIKA UTAFITI HUU?

Iwapo utakubali kushiriki katika utafiti huu, yafuatayo yatafanyika: utahojiwa na mhoji funzi katika eneo binafsi ambapo utastarehe ukijibu maswali. Mahojiano yatachukua muda wa takriban dakika…… Mahojiano yafikia/yatahhusisha mada kama…….. Baada ya mahojiano kufikia tamati, (tueleze kiurefu/kinaganaga/kwa undani utaratibu wowote unaohitajiwa kama utoaji damu, kushauriwa, na kadhalika.) Tutaulizia nambari ya simu ambayo tutawasiliana nawe ikiwa lazima. Ikiwa utakubali kupeana habari ya kuwasiliana

nawe, iatutatumika tu na watu wanaofanyia utafiti huu na haitashirikishwa na wengine. Sababu za kutaka kuwasiliana nawe huenda zikawa…

JE, KUNA HATARI, MADHARA NA KUTOSTAREHE ZINAZOHUSISHWA NA UTAFITI HUU?

Utafiti wa kitiba una uwezo wa kujulisha kisaikolojia, kijamii, na hatari za hisia. Bidii/juhudi inafaa kuekwa katika nafasi ili kupunguza hatari. Hatari moja kati ya kuwepo katika utafiti ni kupoteza faragha. Tutaweka kila utakayotuambia kama siri kama iwezekanavyo. Tutatumia msimbo wa kutambua kwenye siri ya ulinzi ya kompyuta hifadhidata na tuataweka kumbukumbu karatasi katika imefungwa faili baraza la mawaziri.

Hatahivyo, hakuna mbinu ya kulinda usiri wako inaweza kuwa salama kabisa, kwa hivo bado kuna uwezekano kwamba mtu anawezatambua kuwa ulikuwa katika utafiti na anaweza kupata habari kukuhusu. Tena, kujibu maswali katika mahojiano inawezakukosesha starehe. Ikiwa kuna maswali hutaki kuyajibu, unawezaryaruka. Una uhuru wa kukataa mahojiano au maswali yoyote yatakayoulizwa wakati wa mahojiano. Inaezakuwa aibisho kwako kuwa na ……. Tutafanya yote tuwezayo kuhakikisha kuwa haya yanafanyika faraghani.
Aidha, mafunzo ya wafanyakazi wote na watafiti ni wataalamu na mafunzo maalumu katika mitihani/mahojiano haya. Pia, ___ inaweza kuwa chungu (kama tukio anavyoyakumbuka). Anaweza kuhisi baadhi ya usumbufu wakati wa ___ na inaweza kuwa chubuko ndogo inayofanana au uvimbe katika ___ yako. Katika kesi ya kuumia, maradhi au matatizo yanayohusiana na utafiti huu, wasiliana na wafanyakazi kujifunza haki mbali kwenye namba zinazotolewa katika mwisho wa waraka huu. Wafanyakazi wa utafiti watakutibu wewe kwa hali ya madogo au rejea wakati muhimu.

JE, KUNA FAIDA YOYOTE KUWA KATIKA UTAFITI HUU?

Unaweza kufaidika kwa kupokea ___ bure kupima, (Orodha k.m ushauri, taarifa ya afya nk). Tutakuelekeza hospitali kwa ajili ya huduma na kusaidia pale inapohitajika. Pia, taarifa unayotoa itatusaidia sisi kuelewa vyema ___. Taarifa hii ni mchango kwa sayansi na ___

IKIWA KUWA KATIKA SOMO HILI ITAKUGHARIMU WEWE CHOCHOTE? (Eleza) ___

UTAPATA PESA YOYOTE ALITUMIA KAMA SEHEMU YA SOMO HILI? (Ingiza taarifa) ___

VIPI KAMA UNA MASWALI KATIKA SIKU ZIJAZO?

Kama una maswali zaidi au shaka kuhusu kushiriki katika utafiti huu, tafadhali piga simu au tuma ujumbe wa matini kwa watafiti wafanyikazi katika namba iliyotolewa chini ya ukurasa huu. Kwa maelezo zaidi kuhusu haki zako kama mshiriki wa utafiti unaweza wasiliana na Katibu/Mwenyekiti, hospitali ya Taifa ya Kenyatta-Chuo Kikuu cha Nairobi maadili na utafiti kamati Nambari ya simu 2726300 Ext. barua pepe 44102 uonknh_erc@uonbi.ac.ke. Wafanyakazi wa utafiti watakulipa kukurudishia wewe kwa ajili ya mashtaka yako kwa namba hizi kama wito ni kwa ajili ya mawasiliano yanayohusiana na utafiti.

CHAGUO ZAKO NI ZIPI?

Uamuzi wako wa kushiriki katika utafiti ni hiari. Uko huru Kukataa kushiriki katika utafiti na anaweza kujiondoa kutoka utafiti wakati wowote bila dhuluma au kupoteza faida yoyote.

FOMU YA RIDHAA (TAARIFA YA RIDHAA)

Taarifa mshiriki: (nimesoma fomu hii ya ridhaa au nimesomewa taarifa kwangu. Nimekuwa na nafasi ya kujadili utafiti huu pamoja na mtafiti mshauri. Nimekuwa na maswali yangu yaliyojibiwa katika lugha ambayo mimi naelewa. Hatari na faida zimeelezwa kwangu. Ninaelewa kwamba ushiriki wangu katika utafiti huu ni hiari na kwamba ninaezachagua kutoka wakati wowote.

Uhuru nakubaliana kushiriki katika utafiti huu. Nafahamu kuwa jitihada zote zitatolewa kwa kuweka maelezo kuhusu utambulisho wangu binafsi siri. Kwa kutia sahihi fomu idhini, kutokana na haki kisheria ninazo kama mshiriki katika utafiti somo. Nakubali kushiriki katika utafiti huu: Ndiyo Hapana nakubaliana (Fasili kiolezo) kuhifadhiwa kwa utafiti wa baadaye: Ndiyo Hapana nakubaliana kutoa maelezo ya mwasiliani kwa ajili ya kufuatilia: Ndio Hapana Mshiriki No Piga Chapa jina la: ___ ___ Mshiriki saini / gumba muhuri ___ ___ tarehe …… Taarifa ya mtafiti mimi, tumeyatia, nimeeleza kikamilifu maelezo husika ya utafiti huu kwa mshiriki aliyetajwa juu na naamini kwamba, mshiriki ameelewa na ana hiari na uhuru kupeana ridhaa. Jina la mtafiti: tarehe ya ___: ___ saini ___...
Jukumu katika utafiti: ___ [yaani mtafiti mfanayakazi ambaye aliyeelezea fomu ya idhini.]
Kwa habari/taarifa zaidi, wasiliana na ___ katika ___ kutoka ___ hadi ___ shahidi jina la uchapishaji (kama ushahidi ni muhimu, shahidi ni mtu anayependekeza pande zote mtafiti na mshiriki) jina ___ ___ maelezo ya mwasiliano
Saini /gumba muhuri: ___ tarehe; _____

Annex 2: Study Questionnaire

Annex 2.1: QUESTIONNAIRE (ENGLISH VERSION)

TITLE:

COMPARISON OF THE EFFECT OF INTRAPARTUM NORMAL SALINE AND DEXTROSE INFUSION ON LABOR LENGTH AND PREGNANCY OUTCOMES AMONG NULLIPAROUS WOMEN IN KENYATTA NATIONAL HOSPITAL: A RANDOMIZED DOUBLE BLINDED CONTROLLED TRIAL

All parts of the questionnaire to be filled by principal investigator/ research assistant)

SECTION A: SCREENING PROFOMA

DATE:

PARTICIPANT NUMBER / CODE:

MATERNAL AGE:

LAST NORMAL MONTHLY PERIOD:

GESTATIONAL AGE:

MATERNAL RANDOM BLOOD SUGAR (at admission):

SECTION B: OBSTETRIC HISTORY

1) Admission time
2) Cervical dilatation at admission
3) State of membranes at admission. Tick as appropriate
    a) Intact
    b) Draining clear liquid
    c) Meconium stained liquor
    d) Blood stained liquor

4) Time of diagnosis of **Active Phase of Labor (cervical dilatation on ≥ 6cm)**

5) Time intravenous fluid was started

6) Unblinding of study(Intentional administration of plain normal saline):

    a) During the study, did a need arise for intentional administration of plain normal saline to the participant? (Did the participant develop a contra-indication for administration of dextrose5% in normal saline?)

    YES ----------

    NO ----------

    b) If YES, state reason
        i. Non-reassuring fetal status
        ii. Need for oxytocin augmentation
        iii. Pre-operative hydration for emergency cesarean section
        iv. Others

SECTION C: DELIVERY,NEONATAL OUTCOMES AND ADVERSE MATERNAL EFFECTS

7) Mode of delivery – Tick as appropriate:

   a) Vaginal delivery

   b) Caesarean delivery

8) If vaginal delivery, indicate:-

   a) Time of diagnosis of second stage of labor(full cervical dilatation i.e. 10cm)

   b) Time of delivery

9) Neonatal outcomes Apgar score at 5min ----------

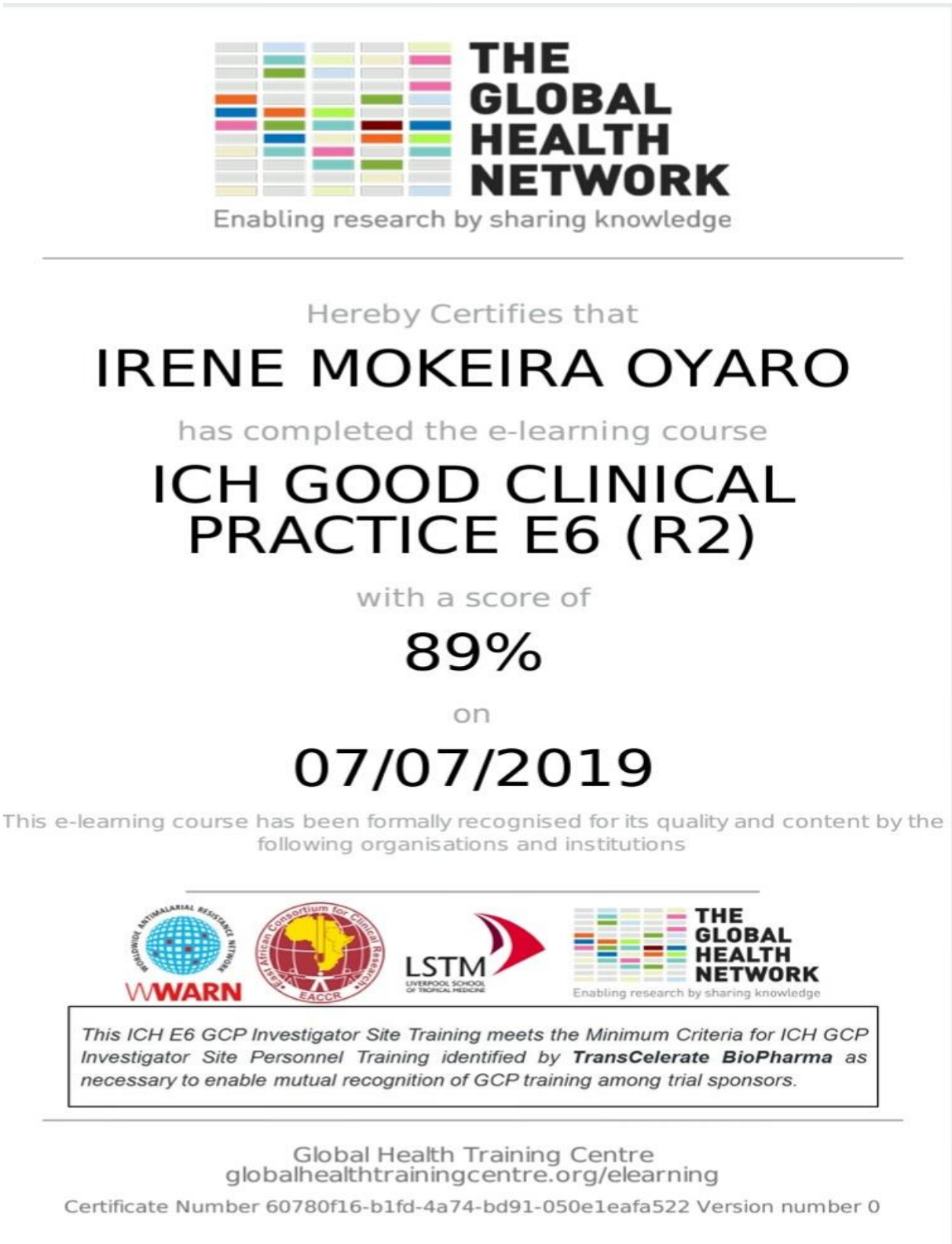
10) Adverse maternal effects:-

    Features of fluid overload

Annex

1) **Duration of Active Phase of Labor**
2) **Duration of second stage**

Annex 4: Certificate of good clinical practice



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UNIVERSITY OF NAIROBI
COLLEGE OF HEALTH SCIENCES
P O BOX 19676 Code 00202
Telegrams: varsity
Tel:(254-020) 2726300 Ext 44355

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

KENYATTA NATIONAL HOSPITAL
P O BOX 20723 Code 00202
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP, Nairobi

KENYATTA NATIONAL HOSPITAL APPROVED 11 OCT 2019 KNH/UoN-ERC P.O. BOX 20723 - 00202 NAIROBI

Ref: KNH-ERC/A/374

11th October, 2019

Dr. Irene Mokeira Oyaro
Reg. No.H58/87579/ 2016
Dept.of Obstetrics and Gynaecology
School of Medicine
College of Health Sciences
University of Nairobi

Dear Dr. Oyaro

RESEARCH PROPOSAL: EFFECT OF INTRAPARTUM NORMAL SALINE AND DEXTROSE-SALINE INFUSION ON COURSE OF LABOUR AND NEONATAL OUTCOMES AMONG NULLIPAROUS WOMEN IN KENYATTA NATIONAL HOSPITAL (A RANDOMIZED DOUBLE BLINDED CONTROLLED TRIAL) (P583/07//2019)

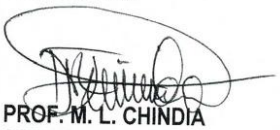
This is to inform you that the KNH- UoN Ethics & Research Committee (KNH- UoN ERC) has reviewed and **approved** your above research proposal. The approval period is 11th October 2019 – 10th October 2020.

This approval is subject to compliance with the following requirements:

a. Only approved documents (informed consents, study instruments, advertising materials etc) will be used.
b. All changes (amendments, deviations, violations etc.) are submitted for review and approval by KNH-UoN ERC before implementation.
c. Death and life threatening problems and serious adverse events (SAEs) or unexpected adverse events whether related or unrelated to the study must be reported to the KNH-UoN ERC within 72 hours of notification.
d. Any changes, anticipated or otherwise that may increase the risks or affect safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH- UoN ERC within 72 hours.
e. Clearance for export of biological specimens must be obtained from KNH- UoN ERC for each batch of shipment.
f. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. (*Attach a comprehensive progress report to support the renewal*).
g. Submission of an *executive summary* report within 90 days upon completion of the study. This information will form part of the data base that will be consulted in future when processing related research studies so as to minimize chances of study duplication and/ or plagiarism.

For more details consult the KNH- UoN ERC website**http://www.erc.uonbi.ac.ke**

Yours sincerely,



PROF. M. L. CHINDIA
SECRETARY, KNH-UoN ERC

c.c. The Principal, College of Health Sciences, UoN
The Director, CS, KNH
The Chairperson, KNH- UoN ERC
The Assistant Director, Health Information, KNH
The Dean, School of Medicine,UoN
The Chairperson, Dept.of Obstetrics and Gynaecology, UoN
Supervisors: Dr. Anne B Kihara(UoN), Prof. Omondi Ogutu(UoN), Dr.Philomena Owende(KNH), Dr.Alex N. Bosire(UoN)

Annex 5: Study Budget

Item	Description	Amount in Ksh.
Personnel	a) 6 research assistants' allowances @ ksh. 450/= per case b) Data clerk/ Statistician @ Ksh. 35,000	Ksh85,500 Ksh. 35,000
Supplies	IV Fluids	KSh. 70,000/=
	INFUSION SET WITH DROP CALCULATOR	Ksh. 20,000/=
	Draft proposals printing: 60pages, 3 copies @ Ksh. 10 per page	Ksh. 1,800
	Final proposal printing; 60 pages, 3 copies @ Ksh.10 per page	Ksh. 1,800
	Questionnaire Printing, 15 pages @ Ksh. 10 per page	Ksh. 150
	Questionnaires	Ksh. 6,000

	photocopying, 15 pages, 200 copies @ Ksh. 2 per page	
	Airtime @ Ksh. 5000	Ksh. 5,000
Transport costs	-	Ksh. 5,000
KNH/UoN ERC	Submission to ERC (twice)	Ksh. 4,000
Miscellaneous costs	-	Ksh. 50, 000
TOTAL		KShs. 234,250

Annex 6: Study timelines

	Feb/March 2019	April 2019	July 2019	Aug/Sept 2019	23rd Nov 2019	23rd April 2020	25th April- 4th May 2020	14th May 2020- 29th May 2020
Concept development								
Proposal development								
Ethical approval								
Data collection								
Data analysis								
Results presentation, dissemination and close out								