PERCEIVED EFFICACY OF NON-PNEUMATIC ANTI-SHOCK GARMENT IN THE MANAGEMENT OF POSTPARTUM HAEMORRHAGE IN TERTIARY HOSPITALS IN NORTHERN NIGERIA

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NIGERIA

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AUGUST, 2014

DECLARATION

I declare that the work in this dissertation entitled "Perceived Efficacy of Non-Pneumatic Anti-shock Garment in the Management of Postpartum Haemorrhage in Tertiary Hospitals in Northern Nigeria" has been carried out by me in the Department of Physical and Health Education. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this dissertation was previously presented for another degree or diploma at this or any other institution.

Addakano Bello Umar _____ _____

Signature **Date**

CERTIFICATION

This dissertation entitled "PERCEIVED EFFICACY OF NON-PNEUMATIC ANTI-SHOCK GARMENT IN THE MANAGEMENT OF POSTPARTUM HAEMORRHAGE IN TERTIARY HOSPITALS IN NORTHERN NIGERIA" by ADDAKANO BELLO UMAR meets the regulations governing the award of the doctorate degree of the Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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Chairman supervisory committee	**Signature**	**Date**
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ABSTRACT

The study aimed at determining the perceived efficacy of Non-pneumatic Antishock garment in tertiary hospitals of Northern Nigeria. That is the North West, North East and North central. An Ex-post facto research design was used for the study. The population of the study included doctors and nurses from selected tertiary hospitals. Stratified random, simple random and purposive sampling techniques were used in selection of hospital respondents. +In these techniques, all the existing states in Northern Nigeria were stratified into the three geopolitical zones ,these are **North East** – Adamawa, Borno, Taraba, Gombe, Bauchi, Yobe States; **North West** – Kaduna, Kano, Jigawa Kebbi, Sokoto, Zamfara, Katsina and **North Central** – Nasarawa, Benue, Kwara, Plateau, Federal Capital Territory, Kogi and Niger States. From each stratum two (2) States were randomly selected. From each randomly selected state, one tertiary hospital was selected purposively and where there are more than one tertiary hospitals, one was selected at random. A total of six (6) States, six (6) tertiary hospitals and three hundred and seventy-five (375) respondents were used for this study. The instrument used for this study was the questionnaire which contained 5 sections (A to E), structured on a four-point Likert scale. A pilot study was conducted in Aminu Kano Teaching Hospital and Usman Danfodio Teaching Hospital Sokoto. The data from pilot study was analyzed using guttmans-split half test. The results showed a reliability coefficient of 0.779 and internal consistency of 0.858. The data collected was analyzed using **t-test and one way analysis of variance** (**ANOVA) at** 0.05 level of significance to test the hypotheses. A constant mean of 2.5 was used to ascertain the agreement of the respondents on the questionnaire items**.** From results of the study, the following findings were made: NASG is significantly available in the tertiary hospitals in Northern Nigeria. Nurses and doctors in tertiary hospitals in Northern Nigeria are aware of

the NASG for management of postpartum haemorrhage. NASG is used by nurses and doctors in tertiary hospitals in Northern Nigeria for postpartum haemorrhage. NASG is considered effective for postpartum haemorrahage by Nurses and doctors in the selected hospitals involved in the study. There is no significant difference between Doctors and Nurses in their awareness, and utilization of the NASG for management of postpartum haemorrahage among nurses and doctors of the tertiary hospitals in Northern Nigeria. In conclusion, there is significant availability, awareness and utilization of the NASG in tertiary hospitals in Northern Nigeria. It is recommended that, Government should make the NASG available in all hospitals in Northern Nigeria. The Non-pneumatic Anti-shock garment should be included in the curricula of medical and nursing students.

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ALARM	-	Advances in Labour and risk management
AMTS	-	Active Management Of Third Stage Of Labour
ANC	-	Antenatal Care
APH	-	Antipartum Haemorrahage
ARDS	-	Adult Respiratory Distress Syndrome
ARF	-	Acute Renal Failure
ASGs	-	Anti-Shock Garments.
BCS	-	British Columbian Section
CPPS	-	Chronic Pelvic Pain Syndrome
C/S	-	Caesarean Section
DIC	-	Disseminated Intravascular Coagulation
FIGO	-	Federation international of Gynaecology & Obstetrics
GAs	-	Gestational Ages
GDP	-	Gross Domestic Product
GHWA	-	Global human resource Africa
HCT	-	Hematocrit
HELLP	-	Haemolysis elevated enzymes and low platelets count.
Hgb	-	Haemoglobin
ICM	-	International Confederation of Midwives
ITP	-	Idiopathic Thrombocytopenic Purpura
MASTs	-	Military/Medical Antishock Garment
MDGs	-	Millennium Development Goals

MMR	-	Maternal Mortality Rates
MVA	-	Manual Vacuum Aspiration
NAPR	-	National Academic Programme Report
NASG	-	Non Pneumatic Anti-Shock Garments
NDHS	-	National health Demographic Survey
NGOs	-	Non Governmental Organisations
PASGs	-	Pneumatic Anti-Shock Garments
OMRU	-	Ottawa. model of research
PPH	-	Postpartum Haemorrhage
PRBCs	-	Parked Red Blood Cells.
RBC	-	Red Blood Cells
SMMA	-	Severe, Acute Maternal mortality
TBAs	-	Traditional birth attendants
UN	-	United Nations
UNFPA	-	United Nations Children Fund
USAID	-	United States Action on International Development
VVF	-	Vesico Vaginal Fistula
WHO	-	World Health Organization
WPDS	-	World Population Data Sheet

OPERATIONAL DEFINITION OF TERMS

- **Adopters:**- Those to use the Non-pneumatic Anti-shock Garment
- **Efficacy:-** The perceived Availability, awareness, utilization and effectiveness of a Non-pneumatic Anti-shock Garment on a patient**.**
- **Hypovolemic shock**:- Lack of enough circulating blood in the body resulting to unconsciousness
- **Innovation:-** A newly introduced for testing
- **Maternal Mortality:-** Is death of pregnant women during pregnancy, labour or Postpartum due to condition related to or aggravated by Pregnancy.
- **Maternal Mortality Rate**:- The number of maternal death due to pregnancy and childbearing per 1000 registered live and stillbirths.
- **Non-pneumatic Anti-shock Garment: -** A Life saving jacket used to reverse shock.
- **Postpartum Haemorrahage:-** Blood loss after delivery of about 500mls or any amount sufficient to cause shock.
- **Tertiary Hospital:-** Hospital that provide specialized care to patients.
- **Utilization:-** Using something for practical purpose.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy irrespective of the duration and the site of the pregnancy from any course related to, or aggravated by the pregnancy or its management but not from accidental or incidental causes (Fraser & Cooper, 2006).

Maternal mortality is a major problem worldwide. Reports shows that 287,000 annual maternal deaths are recorded worldwide, 56% occur in sub-Saharan Africa, a region that accounts for only 21% of the world population. India and Nigeria accounted for one third of the global maternal mortality. Maternal mortality rate (MMR) in Africa is the highest in the world, and it is estimated at 500 deaths per 100, 000 live births (World Health Organisation, United Nations International Child Education Fund, United Nations Funds for Population Activities & World Bank, 2012). The risk of maternal death in Nigeria is 1:29 compared to 1: 25000 in Greece (WHO, UNICEF, UNFPA & World Bank, 2012). Women in developing countries are more than 15 times more likely to die than women in developed countries in childbirth (United State Agency for International Development, 2010). Even within developing countries there is a striking differential risk of maternal death for women who have access to basic essential obstetrical care compared to those who do not. Within a country, as poverty increases so does the proportion of women dying of maternal causes (USAID, 2010). Nigeria constitutes 2% of world's population but contributes 14% of the global estimates of maternal deaths (WHO, UNICEF, UNFPA & World Bank, 2012). Nigeria has the most alarming record of maternal mortality, second to

India throughout the developing world (World Health Organisation, 2010). It is estimated that about 40, 000 women die as a result of pregnancy complication and child delivery in Nigeria (WHO, UNICEF, UNFPA & World Bank, 2012). Like in many developing countries, women in Nigeria do not have access to good quality health services during pregnancy and child birth, especially those who are poor, uneducated or who live in rural areas. Most maternal deaths take place during and soon after child birth, which can be attributed to the fact that less than half of women in Nigeria get adequate health care during these periods (WHO, 2010).

Postpartum haemorrhage is traditionally defined as blood loss greater than 500 ml during a vaginal delivery or greater than 1,000 ml with a caesarean delivery (Geller, Adams, Kelly, Kodkany, & Derman, 2006).

Postpartum haemorrhage (PPH) is the single largest cause of maternal death worldwide accounting for one third (1/3) of all deaths (WHO, 2010). Most of these deaths are largely preventable with skilled attendance and comprehensive emergency obstetric care (WHO, 2010). A woman suffering from PPH can die within two hours unless she receives immediate and appropriate medical care. Quite often the identification of complications and the decision to take a woman to a health facility are delayed and transportation may not be available (Mourad–Youssif, Ojengbede, Meyer, Fathalla, Morhason-Bello, Galadanci, & Miller, 2010). When a woman suffering from postpartum haemorrhage arrives at a health facility and there are no trained staffs, essential supplies or medications available to treat her and this places her life in danger or at risk of dying (McCarthy & Maine, 1992).

Jadesimi and Okonofua (2006) reported that in Nigeria, as in many countries in Africa, the situation of women at delivery is deteriorating largely due to illiteracy and probably because it is a patriarchal society. Doctors and nurses are not adequate to provide sufficient care in rural areas in Nigeria. The national average of maternal mortality ratio (MMR) is 545 per 100 000 live births (National Health Demographic Survey, 2008) and many women do not reach health facilities until it is almost too late, the result in rural hospitals is often higher than the national average. Jadesimi &Okonofua (2006) further reported a study carried out in a hospital in Kano located in, Northern Nigeria, revealed an astonishing MMR of 7,523 per 100 000 live births.

Preventive management of PPH includes measures, taken during antenatal, intranatal and postnatal periods and the antenatal period care included identification of cases of PPH in previous pregnancies and providing them with health education on importance of hospital delivery. Preventive clinical management of the third stage of labour varies from purely expectant, to an active approach, and some variation thereof. The expectant ('pure' physiological) approach involves waiting for clinical signs of placental separation (alteration of the form and size of the uterus, descent and lengthening of the umbilical cord and blood loss) and allowing the placenta to be delivered either unaided using gravity or with the aid of nipple stimulation (Sweet, 1997). In contrast, the full active approach involves administration of an oxytocic agent, early umbilical cord clamping and controlled cord traction for delivery of the umbilical cord (WHO, 2003) may occur.

Management *o*f postpartum haemorrhage requires identifying the cause of haemorrhage, replacing the fluids to prevent shock, using an appropriate uterotonics, applying the Non-pneumatic anti-Shock garment (NASG) when shock occurs, replacing blood and

performing surgery (pathfinder, 2007). Non-pneumatic anti-Shock garment (NASG) is a key component of managing hypovolemic shock and is ensuring that the available blood in the body is directed mostly to the upper parts of the body so that vital organs continue to receive oxygen. The woman is protected from vital organ damage or death (Pathfinder, 2007).

The Non-pneumatic anti-shock garment is a first-aid device that reverses hypovolemic shock and decreases obstetric haemorrhage. It consists of articulated neoprene segments that close tightly with Velcro, shunting blood from the lower body to the core organs, elevating blood pressure and increasing preload and cardiac output (Miller, Martin, & Morris, 2008).

The abdominal segment incorporates a small foam ball that applies pressure to the uterus to decrease bleeding. Unlike the pneumatic anti-shock trousers (PAST), or medical anti-shock trousers (MAST), which preceded the NASG, there are no pumps, tubing, or gauges to add complexity and risk of malfunction. Using the three-way elasticity of neoprene and the tight grip of the Velcro fasteners, the garment can apply 30–40 mmHg of circumferential counter pressure to the lower body from the ankles up to the level of the diaphragm. NASG is an efficient, simple and a safe means to apply external counter pressure to the lower body. It aids resuscitation of central circulation through translocation of up to 30% of the total blood volume from the lower body to the chest and head. Also reduces hemorrhage in lower body by ensuring a decrease in arterial perfusion pressure to the uterus. The pressure in the capillary and venous system (15-25 mm Hg.) is overcome, leading to reduction of transmutably pressure, vessel radius and flow. This stabilizes patient while evaluating, transporting or preparing for definitive surgical treatment in the hospital

(Hensleigh, 2002). With proper monitoring, NASG can be safely and comfortably used for 24 – 48 hours. Use of anti shock garment does not avert the necessity for evaluation to identify cause of shock, management of fluid and blood replacement, and appropriate therapy for coagulopathy (Hensleigh, 2002). Criteria for applying NASG include Blood loss of 750ml or more (in many cases ,blood loss less than 750 with signs of compromised circulation or poor clinical state of patient can be included), Pulse rate of 100 or more/ min, systolic blood pressure of less than 100mm Hg, and Shock (Miller, et al., 2008) .

1.2 STATEMENT OF THE PROBLEM

The health of women in Nigeria is extremely poor, and the rate of maternal mortality in our nation is among the highest in the world (WHO, UNICEF, UNFPA & World Bank, 2012). While maternal mortality ratio are continue to decline globally, the reverse is the case in Nigeria. In addition to the estimated 40,000 women who die each year from pregnancy related complications, another 1,080,000 to 1,620,000 women suffer disabilities related to pregnancy and childbirth that leave them unable to live a healthy and productive lives (USAID, 2011). Northern Nigeria has some of the worst maternal indices in the world. While the South West and South East recorded 165 per 100,000 and 286 per 100,000 respectively, the rate is much higher in the North West and North East, which had 1,025 per 100,000 and 1549 per 100,000 respectively. Urban areas had lower rates of maternal mortality of 351 per 100,000 live births, compared to rural areas in Nigeria with recorded rates of 828 per 100,000 (UNICEF & USAID, 2010).

Hemorrhage is the leading direct cause of maternal deaths in the world - every year, 132,000 women bleed to death while giving birth, that is 46% of deaths globally (USAID, 2011). Globally, a woman dies every seven minutes from the PPH. These deaths can be

prevented with skilled attendance, comprehensive emergency obstetric care and use of simple technology like the anti-shock garment (WHO, 2010). Most women die of haemorrhage in resource setting due to delay in the circulatory volume, getting timely and adequate blood /fluid replacement, thus, leading to hypovolemic shock or death (Miller, et al., 2007). Ijaiya,Aboyeji , and Abubakar, (2003) reported an incidence of 4.5% for postpartum haemorrhage in Ilorin. Jadesimi and Okonofua (2006), reported a study carried out in a hospital in Kano, Northern Nigeria which revealed an astonishing Maternal Mortality Ratio (MMR) of 7,523 per 100 000 live births. The results of a study by Kullami, Kawuwa, Audu, Geidam, and Mairiga, (2009), in a tertiary hospital in Northern Nigeria (FMC, Nguru) revealed that, the MMR was 2849/100,000 deliveries, postpartum haemorrhage (PPH) contributing 17%. In 2006, the Joint Statement of the International Confederation of Midwives (ICM) and the Federation International of Gynaecology and Obstetrics (FIGO) recommended research on Anti-shock garments to reduce mortality among women suffering from postpartum haemorrhage (ICM/FIGO, 2010).

The Non-pneumatic anti-shock garment (NASG) was introduced as a gadget that can be used for first aid treatment of women in postpartum shock prior to proper investigation and appropriate management of the patient (Haslegh, 2002). Studies conducted by Mourad-Youssif, et al., (2010) in Nigeria to establish the efficacy of the NASG in reducing postpartum haemorrhage and resuscitating patient with hypovolemic shock revealed that, the NASG is promising for reducing blood loss emergency hysterectomy, morbidity and mortality associated with PPH in referral facilities in Nigeria. Considering the alarming rate of maternal mortality, the problem of postpartum haemorrhage in Northern Nigeria and the promising results of the Non-pneumatic Anti-shock garment (NASG) studies, the

researcher was motivated to carry out this study, to assess the availability, awareness, utilization and effectiveness of the Non-pneumatic Anti-shock garment on postpartum haemorrhage in tertiary hospitals of Northern Nigeria.

1.3 PURPOSE OF THE STUDY

The main purpose of this study was to determine the availability, awareness, utilization and effectiveness of the Non-pneumatic anti-shock garment in managing post partum haemorrhage (PPH) in tertiary hospitals of Northern Nigeria.

The specific purposes are:-

i. To determine if the Non-pneumatic anti-shock garment is available in the tertiary hospitals of Northern Nigeria.
ii. To find out whether doctors and nurses in tertiary hospitals of Northern Nigeria are aware of the Non-pneumatic anti-shock garment.
iii. To find out whether the Non-pneumatic anti-shock garment is being utilized for management of (PPH) in the tertiary hospitals of Northern Nigeria.
iv. To determine the effectiveness of the Non-pneumatic anti-shock garment being used on postpartum haemorrhage in Northern Nigeria.
v. To find out if there is any difference between Doctors and Nurses in the awareness of the Non-pneumatic anti-shock garment in the tertiary hospitals of Northern Nigeria.
vi. To find out if there is any difference in the utilization of the Non-pneumatic anti-shock garment in the tertiary hospitals of Northern Nigeria.
vii. To find out if there is any difference between male and female Nurses in their awareness of the Non-pneumatic anti-shock garment between Doctors and Nurses in the tertiary hospitals of Northern Nigeria.

viii. To find out if there is any difference in the Availability of the Non-pneumatic anti-shock garment among tertiary hospitals of Northern Nigeria.

1.4 RESEARCH QUESTIONS

i. Is the Non-pneumatic anti-shock garment available in tertiary hospitals of Northern Nigeria?

ii. Are doctors and nurses in tertiary hospitals of Northern Nigeria, aware of the Non-pneumatic anti-shock garment?

iii. Is the Non-pneumatic anti-shock garment utilized in tertiary hospitals of Northern Nigeria?

iv. How effective is the Non-pneumatic anti-shock garment in the management of post partum haemorrhage in tertiary hospitals of Northern Nigeria?

v. Are there any differences between Doctors and Nurses in their awareness, of the Non-pneumatic anti-shock garment in the tertiary hospitals of the Northern Nigeria?

vi. Are there any differences between Doctors and Nurses in their utilization, of the Non-pneumatic anti-shock garment in the tertiary hospitals of the Northern Nigeria?

vii. Are there any differences between male and female Nurses in their awareness, of the Non-pneumatic anti-shock garment among the tertiary hospitals of the Northern Nigeria?

viii. Are there any differences in the availability, of the Non-pneumatic anti-shock garment among the tertiary hospitals of the Northern Nigeria?

1.5 SIGNIFICANCE OF THE STUDY

The result of the study would be useful in the following ways:- it would

i. Increase awareness about the utilization of Non-pneumatic anti-shock garment in tertiary hospitals of Northern Nigeria.

ii. Provide information for health care providers about the effectiveness of Non-pneumatic anti-shock garment on postpartum haemorrhage in the reduction of maternal mortality.

iii. Provide information for health care planners to develop policies that will ensure availability and utilization of the Non-pneumatic anti-shock garments in hospitals of Northern Nigeria.

1.6 BASIC ASSUMPTIONS

The basic assumptions of this study are as follows:

i. The availability of Non-Pneumatic Anti-shock garment may promote its awareness.

ii. Awareness of the Non-Pneumatic Anti-shock Garment, would promote its utilization.

iii. Adequate utilization of the Non-pneumatic anti-shock garment would reduce the consequences of postpartum haemorrhage among women.

1.7 HYPOTHESES

Major Hypothesis

There is no significant availability, awareness, utilization and effectiveness of non-pneumatic anti-shock garment for management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria.

Sub-Hypothesis I

There is no significant availability of NASG for management of PPH in tertiary hospitals of the Northern Nigeria.

II

There is no significant awareness of NASG for management of PPH in tertiary hospitals of Northern Nigeria.

III

There is no significant utilization of NASG for management of PPH in tertiary hospitals of Northern Nigeria.

IV

There is no significant difference between Doctors and Nurses in their perceived awareness, of Non-pneumatic anti-shock garment in the management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria.

V

There is no significant difference between Doctors and Nurses in their perceived utilization, of Non-pneumatic anti-shock garment in the management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria.

VI

There is no significant difference in the perceived awareness of Non-pneumatic anti-shock garment for management of postpartum haemorrhage between male and female nurses in tertiary hospitals of the Northern Nigeria.

VII

There is no significant difference in the Availability, of Non-pneumatic anti-shock garment for the management of postpartum haemorrhage among tertiary hospitals of Northern Nigeria.

1.8 DELIMITATION OF THE STUDY

The study was delimited to the availability, awareness, utilization and perceived effectiveness of the Non-pneumatic anti-shock garment on postpartum haemorrhage in tertiary hospitals of Northern Nigeria. Doctors and Nurses in the tertiary hospitals were used for the study.

1.9 LIMITATION

I. The study was limited to tertiary hospital as such the result cannot be generalized to all hospitals (secondary and primary). Similar study covering secondary and primary hospitals in Northern Nigeria should be undertaken.

II. Some of the instruments collected for the study were not properly completed, as such the researcher used only the correctly filled questionnaire for analysis.

CHAPTER TWO

REVIEW OF RELATED LITERATURE/THEORETICAL FRAME WORK

2.0 INTRODUCTION

Various literatures related to the subject of study were reviewed and arranged as follows:

- Postpartum Haemorrhage
- Shock and Postpartum Haemorrhage
- The Non-pneumatic Anti-shock garment
- Availability and awareness of Non-pneumatic Anti-shock garment
- Utilization of Non-pneumatic Anti-shock garment
- Effectiveness of the Non-pneumatic Anti-shock garment
- Theoretical Frame Work
- Summary

2.1 POSTPARTUM HAEMORRHAGE

Defining postpartum haemorrhage (PPH) is problematic and has been historically difficult. Waiting for a patient to meet the postpartum haemorrhage criteria, particularly in resource-poor settings or with sudden haemorrhage, may delay appropriate intervention (Geller, et al. 2010). Postpartum haemorrhage is traditionally defined as blood loss greater than 500 ml during a vaginal delivery or greater than 1,000 ml with a caesarean delivery. British Colombian Section (2006) stated that PPH is defined as blood loss of more than 500 ml following vaginal delivery or more than 1000ml following caesarean delivery. Chelmow (2008) also stated that, postpartum haemorrhage is characterised by an estimated blood loss greater than 500 ml. The addition of "a 10% drop in hemoglobin" to the definition provides an objective laboratory measure (Yiadom & Carusi, 2010). According to Smith and

Barnaba (2010), another consideration is the differing capacities of individual patients to cope with blood loss. A healthy woman has a 30-50% increase in blood volume in a normal singleton pregnancy and is much more tolerant of blood loss than a woman who has pre-existing anaemia, an underlying cardiac condition, or a volume-contracted condition secondary to dehydration or pre-eclampsia. Smith and Barnaba (2010) reported that, for these reasons stated above, various authors have suggested that PPH should be diagnosed with any amount of blood loss that threatens the homodynamic stability of the woman. Postpartum haemorrhage (PPH) is an obstetrical emergency that can follow vaginal or caesarean delivery. It is a major cause of maternal morbidity, and one of the top three causes of maternal mortality in both high and low per capita income countries, although the absolute risk of death is much lower in high income countries (1 in 100,000 versus 1 in 1000 births in low income countries) (Jacop, 2010).

Ujah and Ejeh (2010), Stated that in Nigeria, as in other parts of the world, postpartum haemorrhage is the most common cause of maternal death and other causes include, retention of placenta or placental fragments, trauma to the genital tract, prolonged second stage of labour, multiple gestations or hydramnios, past history of postpartum haemorrhage, antipartum haemorrhage, uterine fibroids, mismanaged third stage of labour, and caesarean section. Ujah and Ejeh (2010) also stated that, although specific studies on postpartum haemorrhage in Nigeria are still scanty, contribution of postpartum haemorrhage to maternal mortality is high and well documented. Postpartum haemorrhage accounted for a quarter (25%) of the annual maternal deaths in Nigeria (Jadesimi & Okonofua, 2006). A study by Anya and Anya (1999), from Umuahia, Eastern Nigeria reported 2.72% incidence and a case of fatality rate of 3.25% was reported for postpartum haemorrhage. Ijaiya,

Aboyeji and Abubakar (2003) also reported an incidence of 4.5% for postpartum haemorrhage in Ilorin. At the University of Nigeria Teaching Hospital, Enugu, South East Nigeria, haemorrhage was second only to obstructed labour as the cause of maternal mortality, (Adetoro, 1992). Agida, (2009) reported 34.7% incident of PPH in Benue State. The results of a study by Kullami, Kawuwa, Audu, Geidam & Mairiga, (2009), in a tertiary hospital in Nguru, Northern Nigeria showed that ,the maternal mortality ratio (MMR) was 2849/100,000 deliveries and postpartum haemorrhage (PPH) contributed 17% deaths. Most women die of haemorrhage due to delay in the circulatory volume getting timely and adequate blood /fluid replacement, which is leading to hypovolemic shock or death (Miller, Turan, Dau, Fathalla, Mourad, Sutherland…, Gipson, 2007).

Postpartum haemorrhage is divided into two:-Immediate (primary) PPH: - Occur within 24 Hours of delivery. Late (Secondary) PPH: bleeding that occur after 24 hrs of delivery until 6 weeks of postpartum (Rudra, Chatterjee, Sengupta, Wankhede, Namdi, & Maitra, 2010).

2.1.1 Causes of Postpartum Haemorrhage

a) **Uterine Atony:** This is the leading cause of PPH, observed alone in 50% to 60% of cases, it presents as painless continuous bleeding, often developing slowly at the beginning. Blood can be concealed in the uterus and not exteriorized until external compression of the uterine fundus is performed. With up to 15% of maternal cardiac output at term supplying the gravid uterus, an atonic uterus can lose 2 liters of blood in 5 minutes. Atony is associated with “overdistension” of the uterus (multiparity, polyhydramnios, multiple gestation), as well as retained placenta, excessive oxytocin use during labour, and operative intervention. (Rudra, et al., 2010).

b) **Retained Placenta:** This is the second most important aetiology of postpartum haemorrhage (roughly 20% - 30% of cases) (Rudra et al., 2010). When the placenta remains in the uterus for 30minutes to one hour after the delivery of the baby it is said to be retained. The presence of the placenta interfere with the efficient contraction and retraction of the uterine muscles resulting into bleeding which will ensue with horrifying speed (Fraser & Cooper, 2006).

c) **Genital Tract Lacerations:** The most common injuries incurred at child birth are lacerations and haematomas of the perineum, vagina, and cervix. Most injuries have minimal consequence, but some puerperal lacerations and haematomas are associated with significant haemorrhage, either immediate or delayed (Rudra, et al., 2010).

d) **Uterine Inversion:** An atonic uterus and an open cervix allow the uterus to "turn inside out" through the birth canal. Fundal pressure and inappropriate traction on the umbilical cord to hasten placental delivery contribute to uterine inversion (Rudra, et al., 2010).

e) **Clotting Disorder:** Yiadom and Carusi (2010) discuss the clotting disorder as follows:-

1) **Thrombosis:** During the third stage of labour (after delivery of the fetus), haemostasis is most dependent on contraction and retraction of the myometrium. During this period, coagulation disorders are not often a contributing factor. However, hours to days after delivery, the deposition of fibrin (within the vessels in the area where the placenta enrol, In this delayed period, coagulation abnormalities can cause postpartum adhered to the uterine wall and/or at caesarean delivery incision sites) contribute to bleeding from other causes, most notably

trauma. These abnormalities may be pre-existent or acquired during pregnancy, delivery, or the postpartum period. Potential causes include the following:-

2) **Platelet Dysfunction:** Thrombocytopenia may be related to pre existing disease, such as IDIOPATHIC THROMBOCYTOPENIC PURPURA (ITP) or, less commonly, functional platelet abnormalities. Platelet dysfunction can also be acquired secondary to HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count).
3) **Inherited Coagulopathy**: Pre-existing abnormalities of the clotting system, as factor X deficiency or familial hypofibrinogenemia.
4) **Use of Anticoagulants:** This is an iatrogenic coagulopathy from the use of heparin, enoxaparin, aspirin, or postpartum warfarin (Yiadom & Carusi, 2010).
5) DISSEMINATED INTRAVASCULAR COAGULATION (DIC): THIS CAN OCCUR, FROM SEPSIS, PLACENTAL ABRUPTION, AMNIOTIC FLUID EMBOLISM, HELLP syndrome (a condition of pregnancy characterise by haemolysis, elevated liver enzymes and low platelets), or intrauterine fetal death.
6) **Dilutional Coagulopathy:** Large blood loss, or large volume resuscitation with crystalloid And/or packed red blood cells (PRBCs), can cause a dilutional coagulopathy and worsen haemorrhage from other causes.
7) **Physiologic Factors:** These factors may develop during the haemorrhage such as hypocalcemia, hypothermia, and anaemia (Yiadom & Carusi, 2010).

2.1.2 Prevalence of Postpartum Haemorrhage

Annualy, 132,000 women bleed to death while giving birth, that is 46% of deaths globally (USAID, 2011). Postpartum haemorrhages, which occur nearly 14 million times each year (WHO, 2008). In Africa, Haemorrhage is estimated to be responsible for 60% of all

maternal deaths (Advances in Labour and Risk Management, 2010). In Nigeria, study by Agida (2009) revealed that 34.7% of maternal deaths occur as a result of Postpartum haemorrhage.

The incidence of PPH is 10% of all deliveries (Jacob, 2010). This varies widely, depending upon the criteria used to define the disorder. A reasonable estimate is 1 to 5 percent of deliveries, an analysis of population-based data from the United States National Inpatient Sample for the years 1994-2006 found that the discharge diagnosis of PPH increased 26 percent over this period (from 2.3 to 2.6 percent). Uterine atony was the most common cause of PPH and accounted for most of the increase. The proportion of women diagnosed with uterine atony increased from 1.6 to 2.4 percent over the same interval (Jacob, 2010).

2.1.3 Prognosis of Postpartum Haemorrhage

Most postpartum haemorrhage, particularly in Europe and the USA, is well tolerated by women. However, in low-resource settings, where women may already be significantly anaemic during pregnancy, blood loss of 500 ml is significant. Although pregnancy-related death is rare in the USA, postpartum haemorrhage accounts for 17% of deaths (Axemo, 1995). Maternal death is 50 to 100 times more frequent in resource-poor countries. Other significant morbidities associated with postpartum haemorrhage include renal failure, respiratory failure, multiple organ failure, need for transfusion, need for surgery including dilatation and curettage, and, rarely, hysterectomy. Some women with large blood loss will later develop Sheehan's syndrome (A condition where sudden or prolonged shock leads to irreversible pituitary necrosis characterise by amenorrhoea, genital atrophy and premature senility) (Jacob, 2010).

2.1.4 Risk Factors of Postpartum Haemorrhage

The main risk factors for PPH due to uterine atony are high parity, a large foetus, multiple foetuses, or hydramnios (USAID, 2010). Another risk factor is if a woman has previously suffered from PPH. However, the majority of women who suffer from PPH present no risk factors. Retained fragments of placental membranes, infection, and trophoblastic tumours can all produce delayed or "secondary" PPH, defined as haemorrhage after the first 24 hours but less than 6 weeks postpartum (USAID, 2010).

2.1.5 Pathophysiology of Postpartum Haemorrhage

At term, the uterus and placenta receive 500-800 ml of blood per minute through their low resistance network of vessels. This high flow of blood predisposes a gravid uterus to significant bleeding if not well physiologically or medically controlled. By the third trimester, maternal blood volume increases by 50%, which increases the body's tolerance of blood loss during delivery. Following delivery of the foetus, the gravid uterus is able to contract down significantly giving the reduction in volume. This allows the placenta to separate from the uterine interface, exposing maternal blood vessels that interface with the placental surface. After separation and delivery of the placenta, the uterus initiates a process of contraction and retraction, shortening its fibre and kinking the supplying blood vessels, like physiologic sutures or "living ligatures."If the uterus fails to contract, or the placenta fails to separate or deliver, then significant haemorrhage may ensue. Uterine atony, or diminished myometrial contractility, accounts for 80% of postpartum haemorrhage. The other major causes include abnormal placental attachment or retained placental tissue, laceration of tissues or blood vessels in the pelvis and genital tract, and mater coagulopathies. An additional, though uncommon, cause is inversion of the uterus during placental delivery. The traditional pneumonic "4Ts: tone, tissue, trauma,

and thrombosis" can be used to remember the potential causes. Here, a 5th is added; "T" for uterine inversion that will be called "traction" (Yiadom & Carusi, 2010).

2.1.6 Prevention of Postpartum Haemorrhage (PPH)

The prediction of postpartum haemorrhage (PPH) using antenatal risk assessment is poor, only 40% of women with an identified risk factor develop PPH. However, with changes in obstetric population (e.g. increasing maternal age at birth, increasing number of women with complex medical disorders becoming pregnant) and advances in technology (e.g. assisted delivery/reproduction) leading to an increased rate of multiple pregnancy, increasing caesarean section rates leading to placenta praevia and its sequelae, some of the risk factors may become more important and others less so in future (Ihjirika, 2009). Great grand multiparas were traditionally taught to be at high risk of PPH but some studies showed that their risk may be lower or not greater than that of women of lower parity (Ramanathan & Arulkumaran, 2006).). Women with these risks should be transferred to centers with transfusion facilities and an intensive care unit (ICU) for delivery, if these are not available locally.

Dean, Serikas and Lalonde (2010) stated that active management of the third stage of labour is an evidence-based means of preventing PPH as there is no predictive factor for PPH. In most cases, haemorrhage comes as a complete surprise. Thus, every woman should benefit from available preventive measures. They further explained that, the physiologic evolution of labour is characterised by distinct phases or stages. The third stage consists of the expulsion of the placenta and membrane and begins immediately after the birth of the baby. Typically, the muscles of the uterus contract and the placenta begins to separate from the uterine wall until it is eventually expelled (Dean, et al., 2010). The amount of blood loss

depends on how quickly this stage occurs. Subsequently, active management of the third stage of labour calls for:-

1) Administration of uterotonics as soon as possible after the anterior shoulder of the baby is born;
2) Clamping the cord within a minute of the baby's birth and
3) Applying controlled cord traction (CCT) along with counter traction on the uterus during uterine contractions (Dattijo, 2010).

According to WHO (2000), the following steps should be taken:

1) Place the baby on the mother's abdomen;
2) Thoroughly dry the baby, wipe the baby's eye and assess the baby's breathing;
3) Clamp and cut the umbilical cord;
4) Palpate the mother's abdomen to rule out the presence of another baby;
5) Within one minute of birth, give Oxytocin 10 units intramuscularly;
6) Await strong uterine contraction (2 – 3 minutes);
7) Apply counter-traction above the pubic bone;
8) If the placenta does not descend, stop traction and await the next contraction; and after the placenta delivery, rub the fundus of the uterus gently every 15 minutes for 2hours to ascertain that it is contracted.

2.1.7 Management of Postpartum Haemorrhage

Medical management

Oxytocin, Prostaglandins and other haemostatic agents' e.g. intravenous tranexemic acid, an antifibrinolytics widely used in management of menorrhagia can be used successfully in

life threatening PPH, but its safety and efficacy remain untested in chemical trials (Prevention of Postpartum Haemorrhage, 2010).

Surgical Management

Ongoing bleeding requires evaluation in the operating theatre. Uterine atone must be reassessed, uterine inversion excluded, and a re-examination performed to include retained product/tissue and trauma. Surgical interventions include:-

Tamponade or uterine packing, compression suture, systemic devascularization, subtotal or total abdominal hysterectomy, interventional radiology (Ramanathan & Arulkumaran, 2006).

Emerging Technologies in management of PPH include the use of misoprostol, hydrostatic balloon condom catheter and Non-pneumatic anti-shock garment (NASG) in the prevention of shock due to obstetric haemorrhage (Tsu, 2004).

2.1.8 Establishment of Etiology (Assessment)

Help from multidisciplinary team is vital at an early stage in PPH, as it can lead to circulatory collapse within minutes. Assessment of vital signs and amount of blood-loss must be made immediately and continually throughout resuscitation. Fluid resuscitation in obstetric haemorrhage is often overly conservative because of underestimation of volume and rapidity of blood loss, delay in symptoms of hypovolemia developing in women with good compensatory mechanisms, concerns that over resuscitation will lead to pulmonary oedema, or failure to be aware of the dynamics of fluid shift in the body. A loss of 1 litre of blood requires replacement with 4 to 5 litres of crystalloid or colloids until cross

matched blood is available; as most of the infusions shift from the intravascular to the interstitial space (Ramanathan & Arulkumaran, 2006).

2.1.9 Classification of Maternal Blood Loss in PPH

Degree of blood loss is divided into 4 (four) classes depending on the amount of volume deficit (Coker & Olive, 2010).

Class I

Blood loss of less than or equal to 900 ml or Volume deficit of less than or equal to 15 % is asymptomatic.

Class II

Blood loss of 1200 ml to 1500 ml or Volume deficit of 20 to 25%.Clinically, Manifested by

1) Rapid pulse rate & respiratory rate
2) Delayed refilling
3) Narrow Pulse pressure

Class III

Blood loss of 1800ml to 2000 ml or Volume deficit of 30 to 35%.Clinically, manifested by

1. Overt Hypotension
2. Marked tachycardia (120-160 bpm)
3. Marked tachypnea (30-35 / minute)
4. Cold and clammy skin

Class IV

Blood loss of more than or equal to 2400ml or Volume deficit of more than or equal to 40%, manifested by:

1) Weak or absent Bp and PR

2) Oliguria/anuria
3) Cardiovascular collapse
4) Cardiac arrest
5) Death (Coker & Olive, 2010)

2.1.10 Options in Management of Postpartum Haemorrhage (PPH)

Definitive haemorrhage therapies, blood transfusions and surgery are often hours or days away from the home or facility where many birthing women begin to haemorrhage. Obstetric haemorrhage can be fatal even in high-resource settings, such as the United Kingdom, (B-Lynch, Lalonde & Kuroshi, 2006).

Rapid recognition or early identification, resuscitation and restoration of circulating blood volume and simultaneous identification and treatment of the cause is the key to the treatment/management of PPH. Although, the presentation of PPH is often dramatic, bleeding can occur slowly, highlighting the importance of recognizing the clinical signs of varying degrees of hypovolemia and shock (American College of Obstetricians and Gynaecologist, 2006).

2.2 SHOCK AND POSTPARTUM HAEMMORRHAGE

2.2.1 Definition

Shock is usually defined as a severe pathophysiological syndrome associated with inadequate or disordered tissue perfusion and abnormal cellular metabolism. The term actually encompasses a group of cardiovascular disorders with distinctive aetiologies and pathophysiological patterns. The most important subgroups are hypovolemic, septic,

anaphylactic and cardiogenic shock, but other types such as traumatic and toxic shock are also recognized (Duane, 2011).

2.2.2 Hypovolemic Shock

As define by free Medical Dictionary Encyclopaedia (2011), hypovolemic shock is a shock due to insufficient blood volume, either from haemorrhage or other loss of fluid or from widespread vasodilatation so that normal blood volume cannot maintain tissue perfusion. Duane (2011) support the above statement, stating that hypovolemic shock occur due to plasma loss due to burns, dehydration, traumatic shock due to blood loss and major tissue damage.

2.2.3 Pathophysiology of Hypovolemic Shock

The pathophysiological process of hypovolemic shock is straight-forward. Blood and/or fluids have left the body, causing a decreased amount of volume in the blood vessels. Venous return is decreased because of the lack of fluid in the vascular space, causing decreased ventricular filling. The ventricles do not have as much blood as normal to pump out, so the stroke volume is decreased. The heart rate will increase to compensate for the diminished stroke volume, resulting poor cardiac output and blood pressure. Eventually, if the fluid or blood loss continues, the heart rate will not be able to compensate for the decreased stroke volume. The end result of hypovolemic shock is inadequate tissue perfusion (Duane, 2011).

2.2.4 Clinical Signs of Hypovolemic Shock

1) Fast and or weak pulse greater than 100beats per minutes.
2) Low blood pressure less than 100mmHg systolic

3) Pallor, sweating and cold skin.

4) Fast breathing.

5) Anxious or confused.

6) Unconsciousness

7) Urine output less than 30mls/hr (Duane, 2011).

2.2.5 Management of Hypovolemic Shock

1) Call for help

2) Start resuscitation

3) Asses bleeding

4) Check uterine tone

6) Check vital signs

7) Now and every 15 minutes

8) Prepare for referral depending on level of care

9) Apply Non-pneumatic Anti-shock garment (NASG) (Duane, 2011).

2.3 CONSEQUENCES OF POST PARTUM HEAMORRHAGE

a) Immediate

I) Related to Bleeding - Hemorrhagic shock/severe anaemia

- Acute renal failure (ARF)

- Adult respiratory distress syndrome (ARDS)

- Infection

- Intra – abdominal organ Injury

- Death

II) Related to resuscitation & blood transfusion

• Infection (HBV, HIV)

• Hemolytic anaemia

• Fluid over load - pulmonary oedema

• Acute lung Injury

b) Late

Infertility secondary to amenorrhea (sheen syndrome) (Kassaye, Tabaje & Ayele, 2005).

2.4 THE ANTI-SHOCK GARMENT

Tsu (2004) reporting on a meeting of maternal health specialists on new and under-utilized technologies to reduce maternal mortality, recommended studying the anti-shock garment (ASG) as a method to reduce deaths from obstetric haemorrhage. However, at least 1% of all women still suffer intractable postpartum haemorrhage from uterine atony or other obstetric causes, such as genital lacerations, ruptured uterus, ruptured ectopic pregnancies, or placenta previa, accreta, and abruption. Multiple blood transfusions are often needed to resuscitate and stabilize these women and haemostasis may require surgical interventions. Until the time when quality comprehensive emergency obstetric care (CEOC), including surgery and/or blood transfusions, is readily available for all women, strategies and technologies for haemorrhage treatment and hypovolemic shock resuscitation are needed such that they can be readily provided and easily applied, even by persons with no medical training. Promising technologies to reduce maternal mortality include the non-pneumatic anti-shock garment (NASG) as a technology for reducing the mortality and morbidity associated with obstetric haemorrhage (Hensleigh, 2002). The ASG is a generic term for any compression device that shunts blood from the extremities to the core organs including

the heart, lung and brain, thus reversing shock. A pneumatic anti-shock garment (PASG) has been used for a variety of indications since the mid 1970s. The newest adoption of the ASG is the Non-pneumatic anti-shock garment (NASG), a lightweight, reusable compression suite, comprising five neoprene segments that close tightly with Velcro around the legs, pelvis and abdomen. The NASG has the potential to provide fast, simple resuscitation for women, suffering from severe obstetric haemorrhage, by reducing blood-loss, decreasing time for resuscitation and restoration of vital signs and enhancing organ perfusion before definitive treatment is available. Due to its simplicity and relatively low cost, the NASG may play an important role in overcoming delays that contribute to unnecessary deaths from obstetric haemorrhage (Miller, et al., 2007).

2.4.1 Non-Pneumatic Anti-Shock Garment (NASG)

The NASG is a lightweight, relatively inexpensive, washable neoprene suit composed of articulated horizontal segments with three segments on each leg, one segment over the pelvis and another, over the abdomen, which includes a foam compression ball, using the three-way elasticity of neoprene and the tight closure of the Velcro (Safe Motherhood News Letter, 2010).The garment applies 20–40 mm Hg circumferential counter-pressure to the lower body to reverse hypovolemic shock by shunting blood to the vital core organs.

Figure 1a: The Non-Pneumatic Anti-shock Garment Posterior View (Miller, 2008)

Figure 1b:The Non-Pneumatic Anti-shock Garment Anterior view (Miller, 2008)

2.4.2 Historical development Non-pneumatic anti-shock garment

Before the advent of blood transfusion technologies, George Crile in 1897 tested the concept of counter-pressure to reduce bleeding. He found that applying external pressure on an extremity, first with his hand and then by wrapping the extremities tightly with bandages, resulted in an increase in blood pressure. In 1903, George Crile developed the first hypovolemic compression suit, in order to maintain patients' blood pressure during surgery. It increased peripheral resistance, reduced bleeding and sustained blood pressure. George Crile's device was temporarily abandoned after the introduction of safe blood transfusion technology. The concept was re-introduced during World War II when the anti-gravity suit (G-suit) was developed to prevent syncope during rapid ascent. During the Vietnam War, G-suits were used to resuscitate and stabilize battlefield casualities. The G-suit was later modified from a full-body suit to a half-suit, called Military/Medical Anti-Shock Trouser (MASTs), or pneumatic anti-shock garments (PASGs) (Miller, et al., 2008). The garment was developed in 1971 by Dr Ralph Pelligra of the National Aeronautics and Space Administration/Ames Research Centre (NASA/Ames) based on the PASG's circumferential counter-pressure, but without air bladders, manometers, stop-cocks, foot pump and tubing, and the associated risks of over-inflation and subsequent ischemia, the NASG is a promising first-aid treatment for haemorrhagic shock (MILLER, ET AL., 2007).

2.4.3 Mechanism of Action of Non-Pneumatic Anti-Shock Garment (NASG)

G-suit, Military/Medical anti-shock trouser, pneumatic anti-shock garments, and Non-pneumatic anti-shock garment, all have the same mechanisms of action. Circumferential compression of the abdomen and legs reduces total vascular volume, while expanding the central circulation. In animal studies, the translocation of blood has been estimated to be

750–1000 ml (up to 30%). Garment application results in increased preload, peripheral resistance and cardiac output. Tamponade of vessels, particularly the splanchnic plexus, can diminish further bleeding.

2.4.4 Non-Pneumatic Anti-Shock Garment (NASG) Application

Hensleigh (2002), Recommended the NASG for obstetric haemorrhage with Class II or moderate shock, defined as _750 ml blood loss, pulse _100 BPM and mild hypotension. The NASG is not recommended for use in patients with a viable fetus or with bleeding above the diaphragm, it will worsen patient's condition.

2.4.5 Non-Pneumatic Anti-Shock Garment (NASG) Application Procedure

The NASG application procedure is described by Miller, et al. (2008), as follows:-

1. Open the NASG and place under the woman with the top of the garment at her lowest rib. If the patient is unconscious, two people can roll her onto her side placing the garment underneath her, similar to making an occupied bed.
2. Stretch and fasten the garment tightly, starting with the ankle segments (#1).
3. Continue with #2 segments below the knee and #3 segments around the thighs; for shorter women, fold segment #1 into segment #2 before starting.
4. Secure the pelvic segment (#4) tightly at the level of the symphysis pubis; only one person should secure the pelvic and abdominal segments.
5. Place segment #5 over the umbilicus, close by securing segment #6. If the woman experiences difficulty breathing, slightly loosen – but do not remove – the abdominal segment. If NASG application does not result in prompt increased SBP and decreased pulse, check for adequate tightness and give additional IV fluids (Miller, et al., 2008).

2.4.6 When to Apply the Non-Pneumatic Anti-Shock Garment (NASG)

When to initiate NASG application is dependent upon where in the healthcare delivery system the haemorrhage occurs, the attendants' skills and capacity for blood transfusions and/or surgery. In lower-level facilities, or when women present in shock and with circulatory collapse, the NASG should be applied as the first step in resuscitation; application will fill blood vessels, enabling an IV to be started, or, if there is no capacity for IV infusions, enhanced core organ perfusion (Ramanathan & Arulkumaran, 2006). In obstetric units where there is access to arterial embolization, the NASG can be applied to stabilize the woman, maintain vital signs and decrease bleeding whilst the team assembles (E-sayed, et al., 2006).

2.4.7 Who can apply the non-pneumatic anti-shock garment?

Any trained health care personnel including ambulance driver can apply the Non-Pneumatic Anti-Shock Garment to a bleeding patient in shock (Ojengbede, et al., 2011**)**.

Figure 2: Patient wearing non-pneumatic anti-shock garment (NASG) (Miller, et al., 2008)

2.4.8 Non-Pneumatic Anti-Shock Garment (NASG) Patient Management

If the NASG has been placed as a first resuscitative measure, institute the next steps in haemorrhage protocol: calling for help, assessing vital signs, finding source of bleeding, giving iv fluids, uterotonics, etc. the NASG permits complete perineal access, thus vaginal procedures can be conducted with the NASG in place. Uterine massage can also be performed with the NASG in place. If abdominal surgery is necessary, open only the abdominal/pelvic segments immediately prior to making the first incision; replace them rapidly as soon as surgery is complete (Miller, et al., 2008).

2.4.9 Non-Pneumatic Anti-Shock Garment (NASG) Removal

The non-pneumatic anti-shock garment (NASG) must be removed only under skilled supervision in a setting where vital signs can be monitored and there are adequate IV fluids. The NASG should not be removed until the woman has been haemodynamically stable for at least 2 hours with blood loss 50 ml/hour, pulse 100 BPM and SBP 100 mm Hg. To safely remove the NASG, start with the ankle segments and proceed upwards. Allow 15 minutes between opening each segment for the redistribution of blood, then check vital signs. If SBP falls by 20 mm Hg or the pulse increases by 20 BPM, rapidly replace all segments and consider the need for more saline or blood transfusions. If there is recurrent bleeding, replace the NASG and determine the source of bleeding and further action for treatment. If the NASG is removed incorrectly, by opening the abdominal section first (not in the surgical setting) or by prematurely removing the NASG before the woman has achieved haemo-dynamic stability, the woman will suffer immediate shock. It is therefore essential to follow the removal instructions exactly (Saxena, 2006).

Possible Side Effects: To date, few negative side effects of the NASG have been noted which may include:-

a) Decreased urine output,

b) Hypoxia, dyspnoea, or other form of respiratory distress,

c) Nausea and vomiting. Potential side effects attributed to PASGs have been minimized or eliminated by the improved design of the NASG (Miller, et al., 2008).

2.4.10 Availability of the Non-Pneumatic Anti-Shock Garment

The Non-pneumatic anti-shock garment is available in many sizes as can be seen below:

1) Small – Burgundy

This size is meant for people of thin and small stature. Generally fits people four feet tall or less, and about 36.3kg or less.

2) Regular – Black

This size is meant to be one size fits "All". Generally fits people between 1.1meter to 1.6meter tall, and between 36.3kg and 99.8kg .Regular can be used on children, when short, just simply fold up section #1 over (or into) section #2, then apply as usual starting with section #2.

3) Large–Blue

This size is meant for larger people, big frame and large girth. Approximately 113.4kg and up. The height ratio is the same as in the regular (1.1meter to 1.6meter). If the patient is over 1.63meter or more, it would take a little application adjustment. The Non-pneumatic anti-shock garment is not yet available in the open market, but designated health centers through the efforts of government and pathfinder international (Ojengbede, et al., 2008).

While the World Health Organization recommended that the garment be used to address postpartum hemorrhage until appropriate care is available, it was too expensive and hard to procure for the countries that needed it most—and so PATH stepped in. To increase the garment's availability, PATH focused on reducing the costs of production, from raw materials through manufacturing, transport, and delivery. We also evaluated regulatory factors that might speed up or slow down widespread use. This included developing an efficient and cost-effective shipping plan to get the garment from manufacturers to health clinics (Pathfinder, 2011).

2.4.11 Awareness of Non-Pneumatic Anti-Shock Garment

Oshonowo (2007) in Pathfinder (2011) suggested that, media should be used to increase community awareness of the non-pneumatic anti-shock garment (NASG). Because providers in most health centers have limited capacity, Pathfinder concentrates on training and equipping secondary and tertiary facilities where most crisis cases first appear. Interest in the model is also growing among private sector doctors, who provide 30 percent of deliveries (Wilder, 2009). Health institutions were also train so as to step down training to their students during training periods.

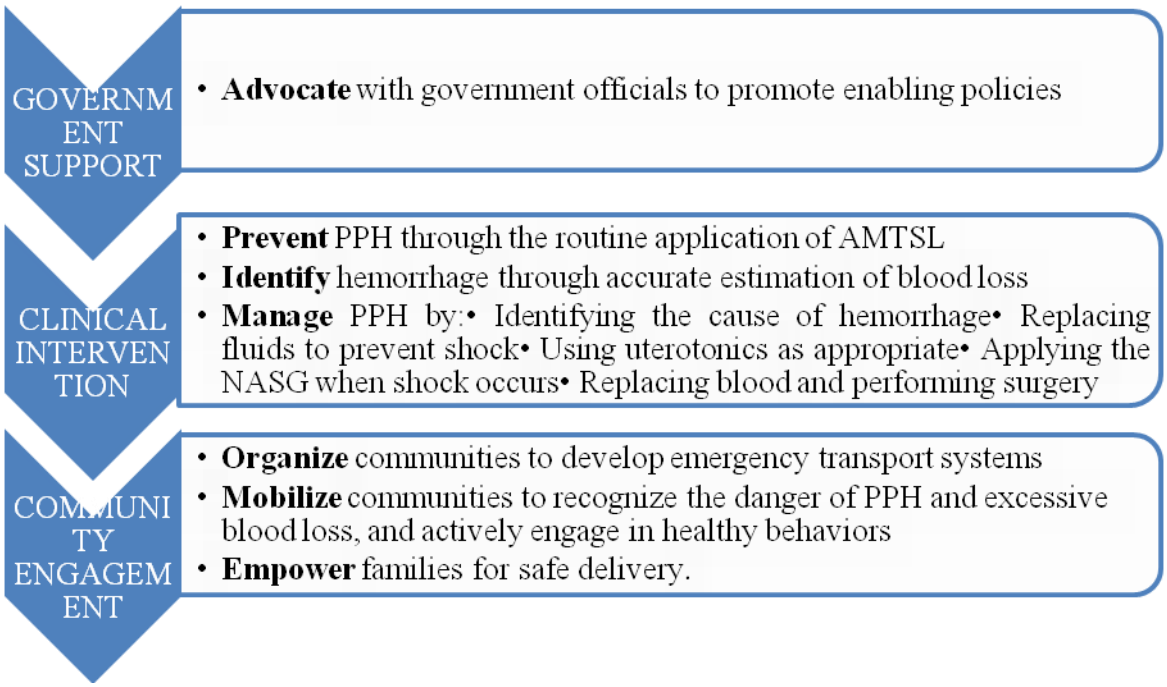

Figure 3: Pathfinder international's community and clinical action to address postpartum hemorrhage approach (Pathfinder international's (2011)

Figure 4: Community awareness creation of non-pneumatic Anti-shock garment (Pathfinder international's (2011)

Pathfinder's Community and Clinical Action to Address Postpartum Haemorrhage (CCA-PPH) has the following actions in view: (1)Increase awareness among community members and providers of the danger signs of PPH and the ability of project technologies like NASG to prevent and manage PPH; (2) Improve capacity of community members to make timely decisions to seek medical care for PPH; (3) Increase ability of community members to identify and reach facilities for PPH treatment; and (4) Improve capacity of health care providers to provide high-quality, timely, and appropriate care to women with PPH. In support of these objectives, Pathfinder's Community and Clinical Action to Address Postpartum Haemorrhage (CCA-PPH) approach incorporates prevention, recognition, and treatment of PPH, including standard methods for estimating blood loss, the non-pneumatic anti-shock garment (NASG) awareness, community-level engagement, and advocacy regarding the need for a continuum of care. Pathfinder has implemented activities in 60 facilities and 42 communities in seven states of Nigeria (Kano, Katsina, Oyo, Lagos, Nasarawa, Ebonyi and Yobe) (Pathfinder, 2011).

2.4.12 Utilization of Anti-Shock Garment

The Non-pneumatic anti-shock garment's (NASG) simple and inexpensive design makes it an easy to use first-aid device in low-resource referral facility settings. The NASG is uniquely suited for use in low-resource countries due to its simple design and relatively low cost (Miller, et al., 2008). After decontamination and laundering, the device can be re-used up to 40 times. In Nigeria, 31 facilities currently use non-pneumatic anti-shock garment, and of the more than 840 haemorrhage cases seen between August 2008 and January 2009, half of the women received the garment. Some women have been sustained by the garment

successfully for more than 50 hours while awaiting access to a facility, a doctor or blood (Wilder, 2009). As of 2010, there were 2000 known cases of obstetric use of NASGs in low resource settings. These were part of clinical trials in Egypt and Nigeria, designed to determine the safety and efficacy of the Zoex NASG product (Miller, et al., 2010).

Vaginal procedures are performed with the NASG in place and abdominal surgeries can be conducted by opening the abdominal section during surgery associated with a significant reduction in blood loss, emergency hysterectomy, combined mortality and severe morbidity, and for morbidity and mortality individually, even when controlling for severity of shock at study entry, parity, and where the woman began bleeding. The NASG is not therapy or treatment but it can be used to buy time to obtain definitive treatment (Mourad-Youssif, et al., 2010). Rapid administration of blood, crystalloid fluids, uterotonics, and access to anaesthesia and surgery are responsible for saving the lives of women with PPH; the NASG enables women to better survive delays until they receive these crucial treatments (Mourad-Youssif, et al., 2010). Adding the NASG to standard shock and hemorrhage management may significantly improve maternal outcomes from hypovolemic shock secondary to obstetric hemorrhage at tertiary care facilities in low resource settings (Miller, et al., 2010).

When women develop hypovolemic shock after an obstetric hemorrhage, using a non-pneumatic anti-shock garment (NASG) improves outcomes. The NASG has been developed in a simplified format for low-resource settings to apply circumferential counter pressure to the lower body, legs, pelvis and stomach with pressure limits to prevent harm. In a study among 1,442 women, use of the NASG reduced median blood loss (from 400 ml

in the pre-intervention phase to 200ml), had emergency hysterectomies (8.9% to 4.0%), and decreased mortality (from 6.3% to 3.5%) (Miller, et al., 2010).

2.4.13 Effectiveness of the Non-Pneumatic Anti-Shock Garment (NASG)

Within 2-5 min after its application, most patients with severe shock regain consciousness and vital signs begin to recover. With the bleeding slowed and the blood the pressure restored, panic levels decrease, and there is time to deliberately assess the situation (Miller, 2008). Bressa, et al., (2004), reported that, the Non-pneumatic anti-shock garment (NASG) outcome include (a) decreased blood loss due to obstetric haemorrhage, (b) fewer emergency hysterectomies, and (c) more rapid recovery from shock. The results of studies by Miler, et al. (2010), reveals that, treatment variables show significantly fewer women in the NASG phase receiving either >1500 ml crystalloid fluids or a blood transfusion or volumes of blood loss. Emergency hysterectomies for intractable uterine atony were reduced by 56%, severe morbidities were decreased by 81%, mortalities were reduced by 44%. The effectiveness of the NASG in reducing blood loss and time to recovery from shock was initially shown in pilot studies in Egypt (Miller, et al., 2006), Studies by Miller, et al. (2007) also revealed that Larger pre-post studies in Egypt and Nigeria indicate that NASG use can significantly reduce maternal mortality and extreme adverse outcomes (EAO) (maternal death or severe maternal morbidity). In Nigeria, the relative risk (RR) of mortality in the NASG intervention phase, compared to the pre-intervention phase was 0.32 (95% confidence interval [C I] 0.14-0.72), (Miller, et al., 2009) and in Egypt, the RR of EAO with the NASG was 0.36 (95% C I 0.16-0.80), (Miller, et al., 2010).

The NASG can make a significant contribution to help women with PPH survive delays, even when the delays are experienced before NASG application. The results of this analysis

indicate that at the referral facility level, the NASG can stabilize women suffering from obstetrical haemorrhage and hypovolemic shock and help them survive delays in obtaining treatment. It appears that the NASG has the biggest impact in settings where delays in obtaining treatment are lengthy.

NASG pilot studies were carried out in comprehensive emergency obstetric care facilities in University of Ibadan, Nigeria (Ojengbede, 2010). Teaching facilities in Egypt (John Snow International 2010), and in primary and secondary health facilities in Mexico (Population Council and IMSS-Opportunidades, 2010). These studies compare use of a standardized protocol of shock and haemorrhage care in the pre-intervention period with the same standardized protocol plus the NASG in the post intervention phase. The primary outcome was volume of measure blood loss after initiation of treatment with or without the NASG. NASG patients had 46 less mean measured blood loss (50% less median measured blood loss) than did those patients not treated with the NASG ($p < 0.001$). NASG and no-NASG patients had similar blood loss during surgery: NASG patients lost only 32 ml more ($p = 0.748$), and NASG patients had a lower amount of estimated 'other' blood loss (spilled on floor, on gauze or towels) compared to no-NASG cases ($p = 0.209$). Patients treated with the NASG had a statistically significant lower amount of post-study entry blood loss (drape + intraoperative + 'other') compared to no- NASGs ($p < 0.001$). The NASG group received 193.3 ml more blood than those receiving the NASG ($p = 0.034$), and the NASG group also received 225.6 ml more of intravenous fluids ($p = 0.06$). There was a no statistically significant 84% lower incidence of severe acute maternal morbidities (SAMMs) and (0.5%) had an extreme adverse outcome among the NASG patients (renal failure), whereas five patients (3.2%) died or suffered SAMMs among the no-NASG

patients .A greater percentage of patients in the NASG group had surgeries compared to no-NASG patients (49.0% vs. 37.8%, $p < 0.03$), perhaps due to their worse condition on study entry. The most common surgeries were Caesarean Section and Salpingectomy. Both groups received comparable dose of oxytocin; for those with uterine atony, the mean total was 30.7 units for no-NASG and 32.0 for NASG patients. A sub-analysis of women who entered the study with severe haemorrhage (> 1500 ml)revealed no difference in frequency by study group, no-NASGs 26.9%, NASG 31.4%, $p = 0.36$. A non-statistically significant decrease was found for extreme adverse outcomes; among those who did not receive the NASG, such outcomes occurred in four patients (9.5%) and in only one NASG patient (4.6%). The results among this sample of women in university teaching hospitals appear very promising. While the women with the NASG had lost more blood and had greater signs of shock, the primary outcome of measured mean blood loss was statistically significantly less. The non statistically significant difference in extreme adverse outcomes is promising (B-Lynch, Keith, Lalonde & Karoshi, 2006).

2.5 THEORETICAL FRAME WORK

2.5.1 The Ottawa Model of Research Use

Aware of the lack of practical models to promote research use, we began assembling diverse aspects of the process of research use into a simple and useful framework, which we call the Ottawa Model of Research Use (OMRU). We created the OMRU framework to be used by policymakers seeking to increase the use of health research by practitioners, as well as by researchers interested in studying the process by which research becomes integrated into practice. The elements of the model are supported by evidence where available. The elements are primarily drawn from the literature relating to research

utilization, the diffusion of innovations, physician behaviour change, and the development and implementation of practice guidelines. The OMRU was refined through discussions with participants in workshops we conducted for the Ontario Health Care Evaluation Network (Graham and Logan 1995, 1996a), conference presentations and clinical education rounds (Graham and Logan 1996b; Harrison, Logan, and Graham 1997; Logan and Graham 1996a, 1996b, 1997). Impetus for developing the model derived not only from our intellectual curiosity about research use but also from our desire to support the multifaceted work on research transfer taking place academically and clinically at the University of Ottawa and the Clinical Epidemiology Unit of the Ottawa Civic Hospital Loeb Research Institute. For instance, the Ottawa Ankle and Knee Rules are excellent examples of attempts to assist clinicians with evidence-based diagnostic decision making (Stiell, et al., 1993.1994, 1996; Stiell, Greenberg, et al., 1995; Stiell, Wells, et al., 1995). The Ottawa Health Decision Center, also part of the Loeb Research Institute, is a leader in developing evidence-based decision aids for patients and is increasingly focusing on research transfer strategies.

The OMRU consists of six key elements that are connected to each other through the process of evaluation (Figure 1). These elements address what we believe to be the central components in the research use process: the practice environment, potential adopters, the evidence-based innovation, & strategies for transferring the evidence into practice, the use of the evidence, and health-related and other outcomes of the process. We are using the term innovation to refer to research evidence that is new to the potential adopter, even though the evidence may have been available for some time (Rogers, 1995). Evidence-based innovations may be evidence that some treatment or practice is beneficial and should

be used, or evidence that some current treatment or practice is not beneficial and should be abandoned or used more selectively. The OMRU can be classified as an interactive model of research use (Weiss, 1979). It views research use as a dynamic process of interconnected decisions and actions by different individuals relating to each of the model elements. The process decisions take place over time and in an order that depends on the specific state of each element within a given context. Although presented as a linear diagram, the nature of the process should not be interpreted as unidirectional. All of the model elements influence and are influenced by each other. The dynamic interaction and interplay between the elements of the model distinguish this model from sequential stage models, which assume that the progression of research into practice occurs in an orderly, linear, and rational way (Buxton & Hanney, 1996). As patients and their health outcomes should be the primary focus of evidence-based practice, one assumption underlying the OMRU is that patients may play a key role in all aspects of the process and therefore must be considered within each model element. Another is that both the general and health care external environments will affect all aspects of the process.

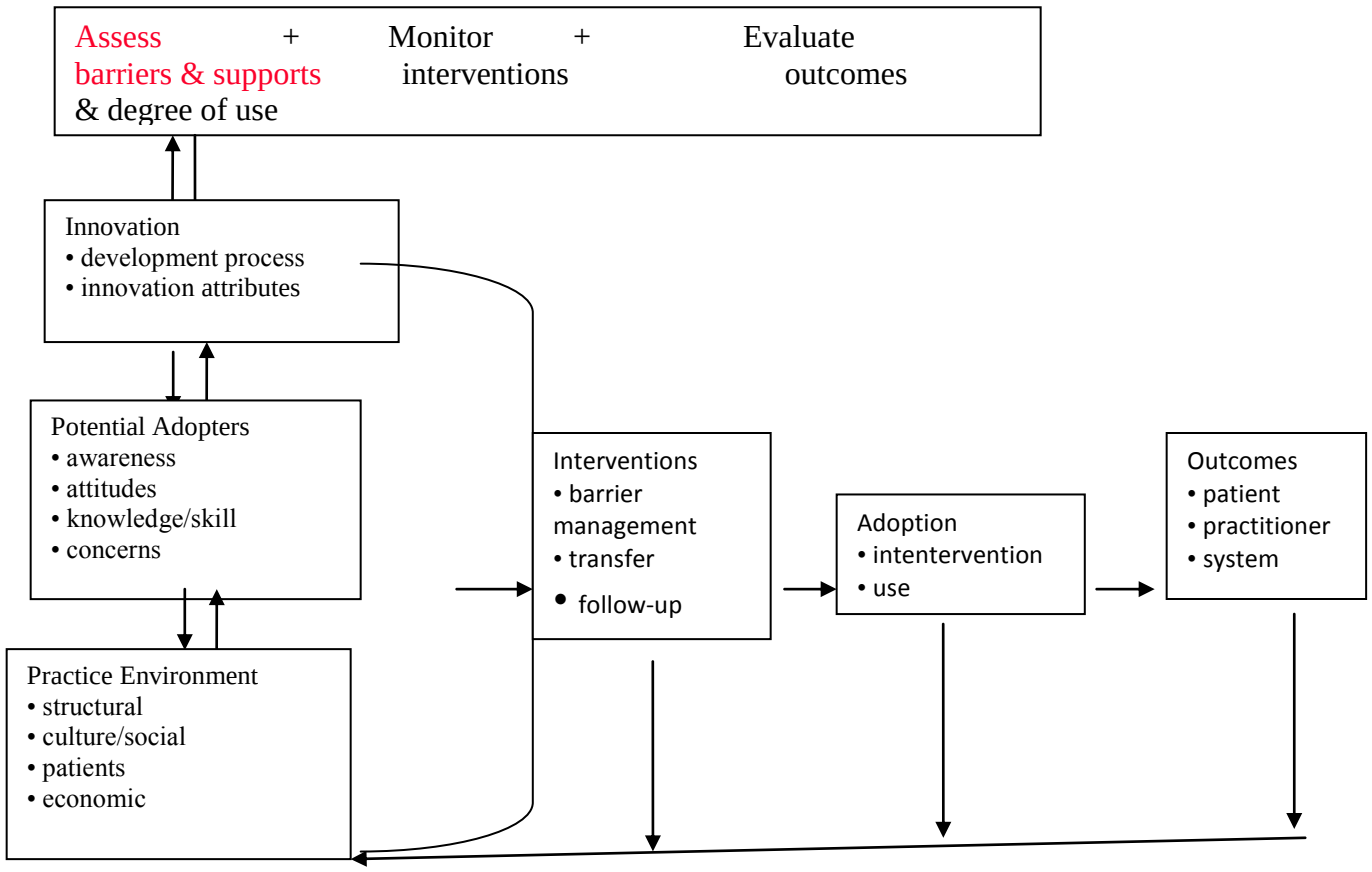

Figure 5: Ottawa model of research use (Logan & Graham, 1998)

Assess, Monitor and Evaluate: Integral to the OMRU is the systematic assessment, monitoring, and evaluation (AME) of the state of each model element prior to, during, and following any research transfer efforts. The AME data serve four functions: (1) to identify potential barriers and supports to research use related to the practice environment, potential adopters, and the evidence-based innovation; (2) to provide direction for selecting and tailoring transfer strategies to overcome the identified barriers and enhance the supports; (3) to track the progress of the transfer effort; and (4) to evaluate the actual use of the evidence-based innovation and its impact on outcomes of interest. The selection of methods to be used to conduct the AME will vary depending on whether the purpose is to assess, to monitor, or to evaluate. Although there is a paucity of validated instruments designed specifically for these efforts, various qualitative and quantitative methods might be used to undertake the AME (see Fig. 5). Green et al. (1980) PRECEDE model suggests conducting a diagnosis of the predisposing, enabling, and reinforcing factors and then addressing those that will promote patient behavioural change. Although useful, this model does not provide any specific direction regarding which issues might be more important to consider when attempting to promote the use of research and would be more complex to implement than the AME.

Elements of the OMRU

From the literature, barriers and supports to research use can arise from three distinct sources: the practice environment, potential adopters, and the evidence-based innovation.

The first step in using the model as a guide is to assess these elements for barriers and supports.

Practice Environment

The environment exerts a powerful set of influences on practitioners, researchers, and policymakers (Lomas, 1994). These influences can encourage or discourage the process of research transfer and use (Funk, et al. 1991, 1995; Haynes, 1993; Walczak, et al., 1994). Sometimes these opposing influences are exerted simultaneously. This element of the model directs attention to identifying, describing, and assessing such influences within the practice environment. These factors may be broadly categorized as structural, social, patient, and other situation-specific factors. Within the practice setting, structural factors such as the settings' decision-making structure; rules, regulations, and official policies; physical structure; workload; available resources and supplies; and the system of incentives are all factors that have been shown to influence research use (Battista 1992; Battista & Mickalide 1990; Elmslie 1994; Elson & Connelly 1995; Funk et al. 1995; Graham 1997; Greco and Eisenberg, 1993; Greer, 1977, 1988; Grol, 1992; Lomas, 1994; Nolan, et al., 1994; Rogers, 1995; Stobberingh, Janknegt & Wijnands, 1993).

Social factors include such things as the politics and personalities involved, the presence of local champions or advocates of the evidence-based innovation, and the culture and belief systems operating within the setting (Brown, Shye & McFarland, 1995; Conroy & Shannon, 1995; Fineberg, 1985; Graham, 1997; Greer 1988; Groll993; Kirchhoff, et al., 1993; Klein et al., 1995; Mittman, Tonesk & Jacobson, 1992; Weiss, 1977, 1979).

Patients are often the source for the questions and problems identified by clinicians or policymakers that trigger the demand for evidence-based practice (Browman, et al., 1995; Titler, et al., 1994; Wise and Billi, 1995). Depending on the type of evidence-based innovation, patients can encourage or discourage their adoption by practitioners. Patient influence or pressure may stimulate practitioner adoption of evidence, while patients' inability or unwillingness to comply with evidence-based recommendations may discourage practitioners from applying the evidence (Brook, 1995; Graham, 1997). Depending on the specific setting, there may also be other salient aspects of the practice environment that policymakers may need to discover and assess for their potential as barriers or supports. For physicians, the medico legal climate may be one such factor that may have considerable impact on the adoption of evidence-based innovations. While assessing the practice environment for barriers and supports to research use, policymakers must consider also another set of factors related to potential adopters of the evidence-based innovation.

Potential Adopters

Patients, clinicians, and other policymakers in the system are all potential adopters of research. The OMRU directs policymakers to identify all potential adopters or target audiences to whom they intend to direct the evidence and to define and describe them in terms of their attitudes, knowledge, motivation for adopting the evidence, skills, and current practices. The interests of potential adopters of evidence vary according to who they are. For example, policymakers use societal or organizational priorities as the context in which they understand research (Weiss, 1980). Clinicians are similarly influenced by considerations other than research findings. For this reason, the OMRU emphasizes the

need to view the proposed change from the potential adopters' perspective and to identify and understand all the scientific and extra-scientific considerations that may influence adoption of the evidence (Eveland, 1986; Greer cited in Kaegi, 1991). All the information collected on the potential adopters can be used to create a profile of adopters focusing on potential barriers and supports to research use.

Evidence-Based Innovation

This model element focuses attention on potential adopters' perceptions of the attributes or characteristics of both the process by which research evidence was translated into some evidence-based innovation (e.g., the process by which a practice guideline was developed) and the innovation itself (e.g., the actual guideline). The OMRU directs policymakers to consider how perceptions of the attributes of the innovation may affect potential adopters' decisions about adoption. This is to be done by identifying the attributes likely to be viewed positively or negatively and tailoring transfer strategies appropriately.

The rationale for this model element is that, attributes of an innovation interact with potential adopters. Mostly outside of health care, different diffusion patterns have been shown to exist for innovations with different attributes (Rogers, 1995). The rate of diffusion varies from setting to setting in part because potential adopters differ in their perceptions of the attributes of the same innovation (Figure 2). If policymakers can minimize potential adopters' negative perceptions of the innovation and maximize their positive ones, then the adoption of the innovation should occur more quickly, with all things being equal. Attributes of the translation process thought to positively influence adoption are credible developers and involvement of potential adopters in the process (Brown, Shye, & McFarland, 1995; Conroy & Shannon, 1995; Grol, 1993). Furthermore, translation

processes should be explicit and transparent, including a rigorous searching of the literature for evidence and incorporating objective methods to synthesize the evidence (Auston, Cahn, & Selden, 1994; Hayward & Laupacis, 1993; Shiffman & Greenes, 1994). Largely in fields outside of health care, attributes of innovations shown to be consistently and positively related to adoption include the innovation being considered compatible with the current way of doing things, the innovation seen to be more advantageous than current practice (relative advantage), and the innovation not considered difficult to do (low complexity) (Tomatzky & Klein,1982). Within medicine, there is some evidence demonstrating that physician compliance with clinical practice guidelines is greater for guidelines that are not difficult to do (low complexity) and easy to try out before making a final decision to go on using it (high trial ability) (Grilli & Lomas 1994). Other attributes seldom considered that might be expected to influence adoption of health care innovations are the risk: benefit ratio for patients of implementing the innovation, ethical considerations, and the format and style of the innovation (being perceived as user-friendly and attractive) (Brown, Shye & McFarland, 1995). In addition, potential adopters may perceive that conflicting evidence or practice guidelines exist. In this situation policymakers can assist potential adopters by making explicit the priorities set for available resources. By understanding potential adopters' perceptions of the innovation, both positive and negative, policymakers are better positioned to respond proactively to these perceptions with appropriate transfer strategies. One potentially useful heuristic for conducting the barriers assessment is the "innovation decision process" proposed by Rogers (1995). The innovation decision process is broken down into five stages potential adopters may go through as they decide to adopt an innovation. The stages in this process are knowledge (awareness of the innovation), persuasion (development of positive attitudes toward the

innovation), decision (a cognitive decision to adopt the innovation), implementation (use of the innovation), and confirmation (continued use of the innovation).

Although the evidence for the innovation decision process in health professions are extremely limited (Brett, 1987; Digan, Tillgre, & Michielutte, 1994; Pathman, et al., 1996), conceptualization of the process of research use in stages may assist policymakers to identify different barriers and supports depending on the stage. Furthermore, it may be necessary to emphasize different strategies at different times as the research use process evolves and more of the cohort of potential adopters moves along the research use decision continuum from the early stages of awareness to the later stages of use and ongoing use. Once policymakers have assessed the practice environment, potential adopters, and the evidence-based innovation and determined the potential barriers and supports related to each of these elements, the next step is to use all the information collected to efficiently select and tailor research transfer strategies to overcome identified barriers and enhance the existing supports.

Research Transfer Strategies

This model element represents the strategies for getting evidence-based innovations to potential adopters and encouraging them to use these strategies. These strategies range from passive unplanned efforts (diffusion, e.g., publication of research findings or practice guidelines in a journal or putting them on the World Wide Web), to targeting and tailoring the evidence and the message for a particular audience (dissemination, e.g., direct mailing), to systematic efforts to encourage adoption of the evidence (implementation, e.g., academic detailing, continuing health education) (Lomas, 1993). Transfer strategies have included such things as provision of educational materials; social marketing, for example, the use of

posters and other forms of advertising; educational activities such as continuing health education conferences and workshops, individual or group instruction, outreach or academic detailing; the use of opinion leaders and educational influentials; audit and feedback individually or as a group; reminder systems; patient influence and patient-mediated strategies; and the use of incentives and sanctions (Lomas & Haynes, 1988; Lomas, et al., 1991). Evidence suggests that strategies that work for one discipline may not be effective with others (Hodnett, et al., 1996). Evidence of the effectiveness of various transfer strategies is fairly limited at present although this body of literature is growing. There are some systematic reviews that have examined the effect of continuing medical education strategies on changing physician performance (Davis, et al., 1995), continuing nursing education on nursing practice (Waddell, 1995), interventions on improving professional practice (Oxman, et al., 1995), computer-based clinical decision support systems on clinical performance (Johnston, et al., 1994), feedback of information on clinical practice (Mugford, Banfield, & O'Hanlon,1991), single and combined implementation strategies in primary care (Wensing & Grol, 1994), and implementation strategies on practice guideline use and impact (Grimshaw, et al., 1995). It should be noted that while all of the research synthesized in these reviews related to changing practitioner behaviour, the focus of much of the original research in the reviews did not consider whether the rationale for the behaviour change was evidence based, a crucial detail. To date, the evidence from the systematic reviews suggests that all implementation strategies work at least some of the time but that none work all of the time. Multiple strategies appear more effective than single ones. Strategies that are nearer to the end users and integrated into the process of care delivery are more likely to be effective. Even the most complex transfer strategies have at best a 20 percent to 50 percent effect in changing of care than on

health outcomes, although the latter effect has been much less often evaluated. The OMRU helps explain these findings by suggesting that the most efficient approach to implementation of research evidence probably rests with tailoring the transfer strategies to the salient barriers and supports found within the particular setting (see Table 2). The greater use of multiple strategies then has likely resulted from policymakers, consciously or unconsciously, simultaneously targeting barriers inherent in the practice environment and related to the potential adopters and evidence-based innovation. The more barriers addressed by the transfer strategies, the greater the use of the evidence-based innovation. In Figure 3, we have combined the work of Rogers (1995) and Lomas (1993) to provide an example of how the OMRU can be used to help tailor research transfer strategies to stages of the innovation decision process.

Research Adoption and Use

Adoption is making full use of an innovation as the best course of action available (Rogers 1995) and represents behavioural change (using the evidence-based innovation). Determining the extent to which the innovation is used is the only way policymakers can assess the success of the transfer strategies employed. By monitoring the adoption process, they can determine whether the innovation is being used as it was intended, whether it has been adapted to local conditions and may no longer be used as intended, or whether it has been adopted and later abandoned. Because the process of research use is evolutionary and interactive, it is essential for policymakers to understand how the innovation has been adopted (or rejected) and how this may have changed over time. In so doing, policymakers are in a better position to modify existing transfer strategies or select new ones to maximize research transfer.

Outcomes

The final element of the model is outcomes, which represent the impact of using the evidence-based innovation. The consequences of research use may be desirable, direct, anticipated, or undesirable, indirect, and unanticipated (Greer, 1988). Direct outcomes can relate to patients and their families, practitioners, and the system (economic outcomes) (Titler, et al., 1994). An important assumption of the OMRU is that a primary objective of research use in health care is that it improves patient health outcomes. For this reason, the evaluation of the initial and ongoing effectiveness of the research use with respect to patient outcomes is needed (Basinski, 1995; Davis & Taylor-Vaisey, 1997). The necessity to monitor and evaluate the outcomes of research use is heightened by the unpredictability of the process of research use and the possibility of unanticipated outcomes, both positive and negative. It is only by evaluating the impact of evidence-based innovations that their true value can be determined.

2.5.2 Application of the Model to the Study

The OMRU is a systematic assessment, monitoring and evaluation (AME) of the state of each model element prior to, during and following any research transfer efforts.

The study; "Availability, awareness, utilization and effectiveness of the Non-pneumatic Anti-shock garment in tertiary hospitals of northern Nigeria", tries to asses the barriers/ supporters, adoption, utilization and outcome on the patients. Tsu (2004) reporting on a meeting of maternal health specialists on new and under-utilized technologies to reduce maternal mortality, recommended studying the Anti-shock garment (ASG) as a method to reduce deaths from obstetric haemorrhage. In 2006, the Joint Statement of the International Confederation of Midwives (ICM) and the Federation International of Gynaecology and

Obstetrics (FIGO) recommended research on Anti-shock garments to reduce mortality among women suffering from postpartum haemorrhage (ICM/FIGO, 2010).Following this recommendations, researchers like Ojengbede (2006) Miller, et al. (2007, 2008,2009,2010), and Mourad–Youssif, et al., (2010) carried out studies to establish the efficacy of the NASG in reducing postpartum haemorrhage and resuscitating patient with hypovolemic shock in Nigeria and Egypt the results revealed that, the Non-pneumatic Anti-shock garment (NASG) is promising.

The three domains of research use as revealed by the OMRU are Assessment of Barriers/Supporters, Monitoring Intervention/Degree of Use and Evaluate Outcome.

A) Assessment

The first domain of the OMRU asses the barriers/supporters which may arise from innovation, adopters and the practice environment. For the purpose of this study the elements will fit as follows:-

- **The innovation**:- The Non-pneumatic Anti-shock garment (NASG). It is produce through research, as a simple device that can be used by the doctors and nurses easily for patients with haemorrhage.
- **The adopters**:- Here, the adopters of the innovation are the doctors and nurses. Barriers/supporters for the adoption of the innovation to be assessed is awareness of the NASG. It is assumed that When Doctors/Nurses are aware of the Non-Pneumatic Anti-shock Garment; it would promote adoption and quality care.
- **The practice environment**:- Patients and physical structure (tertiary hospital of northern Nigeria) form the practice environment. Patients to be considered are

women that had postpartum haemorrhage in the selected tertiary hospitals of northern Nigeria on which the innovation will be used.

B) Monitor intervention and degree of use

This is the second domain of research use. Degree of use (utilisation) of the NASG by the adopters will be assessed. Barriers/supporters for the utilisation that may arise is availability of the innovation in the practice environment. The availability of Non-Pneumatic Anti-shock Garment may promote its awareness and utilization. Therefore the availability of the NASG in the practice environment will be assessed.

C) Evaluation of outcome

This is the third domain of research use, outcome of the use of the NASG will also be assessed by the study, where effectiveness of the NASG will be assessed by the study.

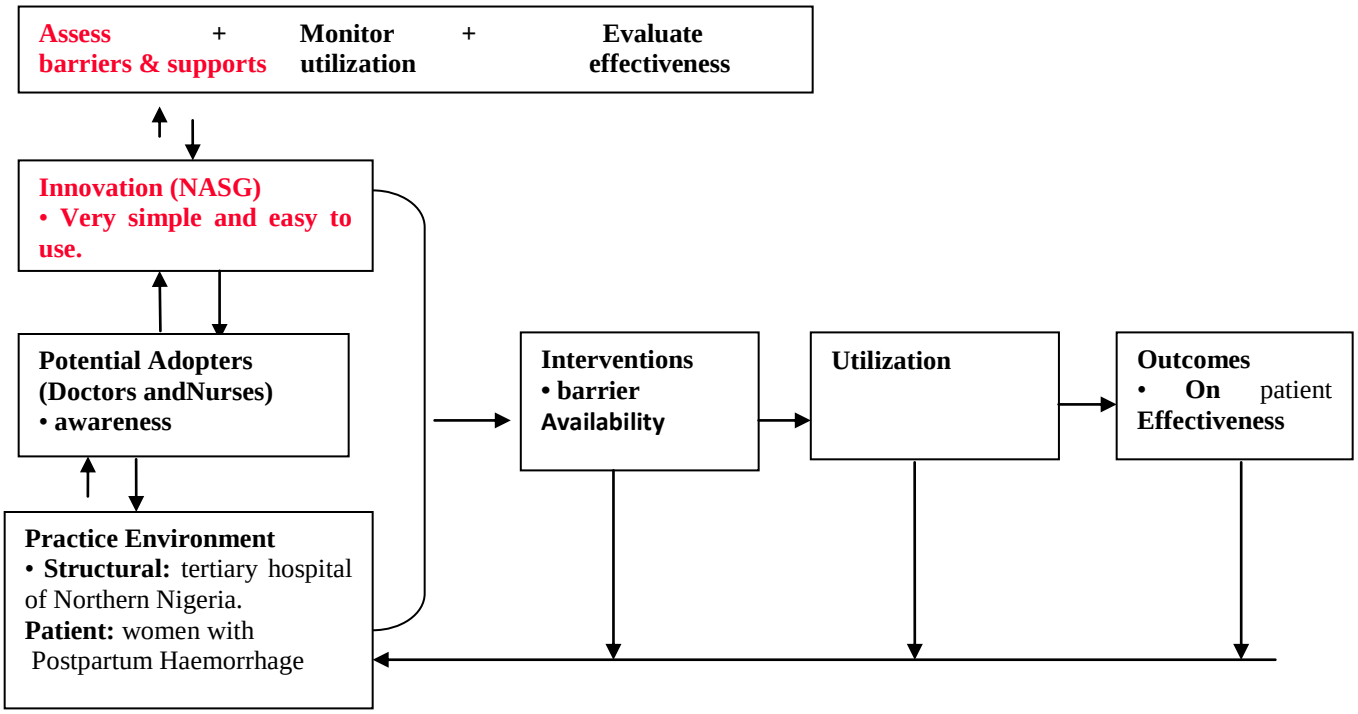

Figure 6: Ottawa model of research use as applied to the study (Logan and Graham, 1998).

2.6 SUMMARY

Various literatures related to the subject of study were reviewed and discussed in this chapter. This includes studies on Postpartum Haemorrhage, Shock, the Non-pneumatic Anti-shock, Availability, Awareness, Utilization of and Effectiveness of the Non-pneumatic Anti-shock Garment and Maternal Mortality. Thirty four percent (34%) of death worldwide is caused by postpartum Haemorrhage. The end result of hypovolemic shock is inadequate tissue perfusion which if not reverse can result in maternal death. Simple technology like the use NASG can easily overcome the situation. The NASG is available in deferent sizes but the largest in being used in the country. Pathfinder international is carrying out activities of awareness creation in communities and health facilities within Nigeria. Studies on NASG revealed that, the NASG is promising in reducing maternal mortality, blood loss and surgeries among women who had PPH.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

The purpose of this study was to determined availability, awareness, utilization and effectiveness of non-pneumatic anti-shock garment on postpartum haemorrhage in Northern Nigeria. To achieve this purpose, the research design, the population, the sample and sampling technique, the instrument, validation of instrument, reliability of instrument, report of pilot study, administration of questionnaire, the statistical techniques that will be used in this study are described in this chapter.

3.1 RESEARCH DESIGN

A descriptive design was adopted for the study. Therefore, ex-post –facto research design was used. Kenlinger (1986) stated that this design is the best tool in descriptive research involving current events or conditions.

3.2 POPULATION OF THE STUDY

The population of this study consisted of Doctors and Nurses in tertiary hospitals of Northern Nigeria. This includes North East with 6 states, North West with 7 states and North Central with 6 states including FCT Abuja. However, these zones consist of 2,112 Doctors and 103,398 Nurses (WHO & GHWA, 2008, National Bureau of Statistics, 2010).

3.3 SAMPLE AND SAMPLING TECHNIQUE

For the purpose of this study, a sample size of 398 respondents was use. This is in accordance with the sample size chart of Isaac & Michael, (1981); Smith, (1983) who reported that for a given population of 100,000 and above, the sample size for such

population could be 398. Stratified random and purposive sampling techniques were used. In these techniques all the existing states in Northern Nigeria were stratified into three geopolitical zones, which are: **North East** – Adamawa, Borno, Taraba, Gombe, Bauchi, and Yobe States; **North West** – Kebbi, Sokoto, Zamfara, Kano, Katsina, Kaduna, Jigawa and **North Central** – Nasarawa, Benue, Kwara, Plateau, FCT Abuja, Kogi and Niger States. Each of these three geopolitical zones constitutes a stratum. From each stratum two (2) States were randomly selected, this is in line with the statement of Gay (1992) who suggested that for a population of few hundreds 30 % is sufficient for generalization. In this selection, all the States were given numbers from which two (2) states were picked by employing dip and pick method (Nworgu, 1991) .Also from each randomly selected state, one tertiary hospital were selected purposive, where there are more than one tertiary hospital in a state, one tertiary hospital were randomly selected. Hence, a total of six (6) States, six tertiary hospitals of which three hundred and seventy five (375) respondents were used from labour ward, postnatal ward, gynae ward, antenatal, emergency ward and gynae outpatient department to serve as respondents for this study using purposive sampling technique at a ratio of 1:4 doctors and nurses. These zones, states, hospitals and sampled number of doctors and nurses are shown in Appendix VI.

3.4 INSTRUMENTATION

The instrument used for this study was the questionnaire. The questionnaire contained 5 sections (A to E). Section A consisted of five statements on demographic characteristics; Section B consisted of seven statements on availability, Section C consisted of seven statements on awareness, Section D consisted of seven statements on utilization and Section E consisted of seven statements on effectiveness of non-pneumatic anti-shock

garment. A four points Likert scale, which is an interval scale of measure, that is, strongly agree, agree, disagree and strongly disagree was used to structure responses for the respondents. The scores of responses was interpreted as follows: Strongly agree (4 points), Agree (3 points), Disagree (2 points) Strongly Disagree (1 point).The four points Likert scale does not give room for indecision and this is very important when dealing with life.

3.5 VALIDATION OF THE INSTRUMENT

Five (5) copies of the questionnaire were given to five (5) jurors. Four experts from the Department of Physical and Health Education of Ahmadu Bello University Zaria and the fifth juror was from the department of obstetrics and gynaecology, Ahmadu Bello University Teaching Hospital Shika, Zaria, in order to ascertain both content and face validity of the instrument. After incorporating all the suggestions made by the jurors, the final questionnaire was prepared for a pilot study.

3.6 PILOT STUDY

To obtain the reliability of the instrument, a pilot study was conducted at Aminu Kano Teaching Hospital (AKTH) and Uthman Danfodio University Teaching Hospital (UDUTH). A total of 50 copies of questionnaire were administered to respondents in the designated area for the pilot study, through a purposive sampling technique with the assistance of six (6) research assistants. The entire 50 questionnaire, were successfully filled and returned and were, therefore, used for the reliability test. The responses to the items were scored and split – half reliability test procedure was used to determine the reliability index as well as the internal consistency coefficient of the instrument. The Statistical Package for the Social Sciences (17^{th} Edition) was used for the statistical analysis. The reliability coefficient obtained for the split-half test procedure was 0.779 with

an internal consistency index of 0.858; this means that the instrument is reliable. Tuck man (1999), observed that the nearer to 1 the reliability co-efficient of an instrument and consistency co-efficient, the more reliable, the instrument. Therefore the instrument was considered reliable for this study and studies of this nature.

3.7 ADMINISTRATION OF INSTRUMENT

The researcher obtained a letter of introduction from the Department of Physical and Health Education, Ahmadu Bello University, Zaria to the tertiary hospitals under study to conduct research on availability, awareness, utilization and effectiveness of non-pneumatic anti-shock garment on postpartum haemorrhage in Northern Nigeria, from which ethical approval was obtained. The researcher, six recruited research assistants trained on details of how to administer and collect the research instrument to and from the respondents, administered the research instrument. Respondents were purposively drawn from labour ward, postnatal ward, gynae ward, antenatal, emergency ward and gynae outpatient department to serve as respondents for this study at a ratio of 1:4 doctors and nurses.

3.8 ANALYTICAL TECHNIQUE

The data collected was collated, coded and analysed. The Statistical Package for Social Science (SPSS package) was used for the data analysis. The data was computed using descriptive statistical tools of frequencies, percentages, mean and standard deviations. The scores were subjected to one tailed t-test and one way analysis of variance (ANOVA) at an alpha level of 0.05 to test the hypotheses. A constant mean of 2.5 was used to ascertain the agreement or disagreement of respondents to the questionnaire items. A constant mean of 2.5 was compared with the observed aggregate mean score for the one tailed t-test computation.

An aggregate mean score of less than 2.5 indicate the absence of non-pneumatic Anti-shock garment (NASG), a lack of awareness, lack of utilization and non-effectiveness of the non-pneumatic Anti-shock garment on postpartum in the facility. While an aggregate mean score of 2.5 and above indicate the availability), awareness, utilization and effectiveness of the non-pneumatic Anti-shock garment on postpartum in the tertiary hospitals of Northern Nigeria.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 INTRODUCTION

The main purpose of the study was to determine perceived availability, awareness, utilization and effectiveness of the non-pneumatic Anti-shock garment on postpartum haemorrhage in tertiary hospitals in Northern Nigeria. To achieve this purpose, 398 questionnaires were administered through purposive sampling technique and 375 (94%) were returned. The data collected in responses to statements related to availability, awareness, utilization, effectiveness on PPH, of non-pneumatic Anti-shock garment (NASG) in tertiary hospitals in Northern Nigeria were statistically analyzed. A constant mean of 2.5 was used for agreement with questionnaire statements. The results are presented and discussed according to the hypotheses formulated, in this chapter.

4.2 RESULTS

The demographic variables of age, sex and designation were presented in table 4:2:1

Table 4:2:1: Demographic Characteristics of the Respondents

Variables	Variable option	Frequencies	Percentage
Age in years	19 – 24	6	1.6
	25 – 29	61	16.3
	30 – 34	139	37.1
	35 – 39	94	25.1
	40+	75	20.0
	Total	**375**	**100.0**
Gender	Male	113	30.1
	Female	262	69.9
	Total	**375**	**100**
Designation	Nurses/midwives	297	79.2
	Doctor	78	20.8
	Total	**375**	**100**

Table 4:2:1 shows the demographic characteristic of the respondents. The subjects were concentrated in the 30 to 34years age (37.1%) with only 6 or 1.6% within 19 and 24years and 61 or 16.3% between 25 and 29years. Also 94 or 25.1% were between 35 and 39years while 75 or 20.0% were above 39years. Of the total number of the respondents, 113 or 30.1% were male and 262 or 69.9% were female. Of the overall total in terms of designation, 297 or 79.2% were Nurses while the remaining 78 or 20.8% were medical doctors.

Table 4:2:2 Mean and Standard Deviation of Respondent's Responses on Availability of NASG

N=375

Availability of NASG	**Mean**	**Std. dev.**
The Non-Pneumatic Anti-shock Garment (NASG) is always available in the hospital.	2.51	1.172
The Non-Pneumatic Anti-shock garment (NASG) is provided freely for use on patients by the hospital management.	2.62	1.095
The Non-Pneumatic Anti-shock Garment (NASG) is Available in the open market.	1.73	0.699
There are two Non-Pneumatic Anti-shock Garment (NASG) available in your hospital	2.15	1.058
The Non-Pneumatic Anti-shock Garment (NASG) is available in different sizes.	2.25	0.915
The Non-Pneumatic Anti-shock Garment (NASG) available in your hospital is a free size.	2.49	1.031
The patient does not have to have the Non-Pneumatic Anti-shock Garment (NASG).	2.49	1.118
Aggregate mean	**2.32**	**0.729**

Table 4:2:2 showed an aggregate mean score of 2.32; though the aggregate mean score was high it was lower than the constant mean of 2.5, this implied that the Non-Pneumatic Anti-shock Garment (NASG) is not available in tertiary hospitals of northern Nigeria.

Table 4:2:3: Mean and Standard Deviation of Respondent's Responses on Awareness of NASG

N=375

Awareness of NASG	**Mean**	**Std. dev.**
The Non-Pneumatic Anti-shock Garment is a light weight washable and inexpensive garment.	3.03	0.257
The Non-Pneumatic Anti-shock Garment is stretchable	3.31	0.770
The Non-Pneumatic Anti-shock Garment is a device for resuscitating patient from shock	3.51	0.674
Every health care personnel should know about the use of the Non-Pneumatic Anti-shock Garment (NASG).	3.43	0.713
You have had training on the Non-Pneumatic Anti-shock Garment (NASG).	2.63	0.761
When applied on a patient, the Non-Pneumatic Anti-shock Garment applies a circumferential pressure.	3.23	0.751
A patient with the Non-Pneumatic Anti-shock Garment (NASG) on can undergo any investigation to find out the cause of the haemorrhage.	3.14	0.841
Aggregate mean	**3.18**	**0.466**

Table 4:2:3 showed an aggregate mean score of 3.18 for awareness of the Non-Pneumatic Anti-shock Garment .This means a consensus agreement among the respondents that the level of awareness of the garment in the hospital was very high.

Table 4:2:4: Mean and Standard Deviation of Respondent's Responses on Utilization of NASG

N=375

Utilization of NASG	Mean	Std dev.
The Non-Pneumatic Anti-shock Garment is applied on patients with obstetric shock by any trained health care personnel.	3.29	0.280
The Non-Pneumatic Anti-shock Garment can be applied on patients from the lower limps, thighs, pelvic region and abdomen.	3.25	0.867
You have applied the Non-Pneumatic Anti-shock Garment can be applied on patients before	2.54	1.064
The Non-Pneumatic Anti-shock Garment stops bleeding and thus prevents surgery.	2.39	0.953
The Non-Pneumatic Anti-shock Garment resuscitates a patient in shock.	3.19	0.909
A single Non-Pneumatic Anti-shock Garment can be used 50- 100 times.	2.88	0.357
Non-Pneumatic Anti-shock Garment is used as an obstetric first aid device and not treatment.	3.23	0.863
Aggregate mean	**2.96**	**0.594**

Table 4:2:4 showed an aggregate mean score of 2.96 which was higher than the constant mean of 2.5, this implies that the respondents were of the view that the Non-Pneumatic Anti-shock Garment is utilized in tertiary hospitals of Northern Nigeria.

Table 4:2:5: Mean and Standard Deviation of Respondent's Responses on Effectiveness of the NASG

N=375

Effectiveness of the NASG	Mean	Std dev.
When Non-Pneumatic Anti-shock Garment (NASG) is placed on women, it reduces bleeding.	3.05	0.908
Non-Pneumatic Anti-shock Garment (NASG) reduces the rate of surgery when applied.	2.96	0.951
Morbidity and mortality is reduced through the use of Non-Pneumatic Anti-shock Garment (NASG).	3.36	0.656
Non-Pneumatic Anti-shock Garment (NASG) when applied keeps the patient alive while being transported to a hospital.	3.42	0.669
Non-Pneumatic Anti-shock Garment (NASG) stabilizes patient while trying to look for the cause of bleeding.	3.43	0.658
Non-Pneumatic Anti-shock Garment (NASG) is very effective in postpartum hemorrhage.	3.37	0.756
Non-Pneumatic Anti-shock Garment (NASG) when applied, translocate 1.5 to 2 litters of blood from lower limps ,lower abdomen to the vital centers	3.29	0.820
Aggregate mean	**3.24**	**0.492**

Table 4:2:5 revealed that, the aggregate mean score was 3.24 which was higher than the constant mean of 2.5, it can therefore be said that the respondents were of the opinion that the Non-Pneumatic Anti-shock Garment was very effective for postpartum haemorrhage treatment in the selected hospitals in the study area.

Sub-Hypothesis I

There is no significant availability of NAGS for management of PPH in tertiary hospitals of Northern Nigeria.

Table 4.2.2.1 Summary of t-test on availability of Non-Pneumatic Anti-shock Garment in tertiary hospitals of Northern Nigeria

Variables	Mean	SD	t-value
Availability	2.32	0.729	4.794
Constant mean	2.50		
t (374) =	**1.96 ≤ 0.05.**		

Table 4.2.2.1 revealed a t-value of 4.794 which was higher than a critical value of 1.96 at a significant level of 0.05 therefore the null hypothesis was rejected, meaning that there is significant availability of Non-Pneumatic Anti-shock Garment for management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria.

Sub-Hypothesis II

There is no significant awareness of NAGS for management of postpartum haemorrhage by Doctors and Nurses in tertiary hospitals of Northern Nigeria. One tailed t-test was used to test the hypothesis and the result is summarized in table 4.2.2.2 below.

Table 4.2.2.2 Summary of t-test for awareness of Non-Pneumatic Anti-shock Garment in tertiary hospitals of Northern Nigeria

Variables	Mean	SD	t-value
Awareness	3.18	0.466	28.391
Constant mean	2.50	0.000	

$t(374) = 1.96 \leq 0.05$

Table 4.2.2.2 revealed an observed t-value of 28.391 which was greater than the critical value of 1.96, hence the null hypothesis was rejected meaning that there is significant awareness of Non-Pneumatic Anti-shock Garment for management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria.

Sub-hypothesis III

There is no significant utilization of NASG for management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria. One tailed t-test was used to test the hypothesis and the summary of the result is presented in table 4.2.2.3 below.

Table 4.2.2.3 Summary of t-test for utilization of Non-Pneumatic Anti-shock Garment in tertiary hospitals of Northern Nigeria.

Variables	Mean	SD	t-value
Utilization	2.96	0.594	15.154
Constant mean	2.50	0.000	

$t(374) = 1.96 \leq 0.05$

Table 4.2.2.3 revealed an observed t-value of 15.154 which was greater than a critical value of 1.96 at a significant level of 0.05, therefore the null hypothesis was rejected implying that there was significant utilization of Non-Pneumatic Anti-shock Garment for management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria.

Sub-Hypothesis IV

There is no significant difference between Doctors and Nurses in their awareness of NASG for management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria. To test this hypothesis, t-test was used and the summary of the result is presented in table 4.2.2.4 below.

Table 4.2.2.4 Summary of t-test for difference between Doctors and Nurses in the awareness of Non-Pneumatic Anti-shock Garment for post partum haemorrhage in tertiary hospitals of Northern Nigeria

Variables	Mean	SD	t-test
Nurses	3.15	0.486	1.812
Doctors	3.24	0.428	

$t(374) = 1.96 \leq 0.05$

Table 4.2.2.4 revealed an observed t-value of 1.812 which was lesser than the critical value of 1.96 at a significant level of 0.05; therefore the null hypothesis was accepted implying that there was no significant between Doctors and Nurses in their awareness of the NASG in tertiary hospitals of Northern Nigeria.

Sub-Hypothesis V

There is no significant difference between Doctors and Nurses in the utilization of NASG for management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria. To test this hypothesis, t-test was used and the summary of the result is presented in table 4.2.2.5 below.

Table 4.2.2.5 Summary of t-test for difference between Doctors and Nurses in the utilization of Non-Pneumatic Anti-shock Garment for post partum haemorrhage in tertiary hospitals of Northern Nigeria

Variables	Mean	SD	t-test
Nurses	2.96	0.635	0.065
Doctors	2.97	0.524	

$t(374) = 1.96 \leq 0.05$

Table 4.2.2.5 revealed an observed t-value of 0.065 which was lesser than the critical value of 1.96 at a significant level of 0.05; therefore the null hypothesis was accepted implying that there was no significant difference between Doctors and Nurses in the utilization of the NASG between Doctors and Nurses in tertiary hospitals of Northern Nigeria.

Sub-Hypothesis VI

There is no significant difference between Male and Female Nurses in their awareness of NASG for management of postpartum haemorrhage in tertiary hospitals of Northern Nigeria. To test this hypothesis, t-test was used and the summary of the result is presented in table 4.2.2.6 below.

Table 4.2.2.6 Summary of t-test for difference between male and female Nurses in the awareness of Non-Pneumatic Anti-shock Garment for management of post partum haemorrhage in tertiary hospitals of Northern Nigeria

Variables	Mean	SD	t-test
Male Nurses	3.17	0.425	0.273
Female Nurses	3.19	0.486	

$t(296) = 1.96 \leq 0.05$

Table 4.2.2.6 revealed an observed t-value of 0.273 which was lesser than the critical value of 1.96 at a significant level of 0.05; therefore the null hypothesis was accepted implying that there was no significant difference between male and female Nurses in their awareness of the NASG for management of post partum haemorrhage in tertiary hospitals of Northern Nigeria.

Sub-Hypothesis: VII

There is no significant difference in the availability, awareness, utilization and effectiveness of Non-Pneumatic Anti-shock Garment on PPH in tertiary hospitals of Northern Nigeria. To test this hypothesis, one way analysis of variance (ANOVA) was used and. The result presented in Table 4:2:2:7a below.

Table 4.2:2:7a: Summary of ANOVA for the on availability, awareness, utilization and effectiveness of NASG by the hospitals

Source	Sum of Squares	DF	Mean Square	F	Sig.
Between Groups	19.159	5	3.832	40.629	.000
Within Groups	34.801	369	.094		
Total	53.960	374			

F (5,369,374) = 2.21 P ≤ 0.05

Table 4:2:2:7a showed an F value of 40.629 which was greater than the critical value of 2.21. at a significant level of 0.05. The null hypothesis that there is no significant difference in the availability, of NASG on PPH in tertiary hospitals of Northern Nigeria was therefore rejected. To determine the hospital(s) that were significantly different from the other, a post hoc test was conducted on the mean using the Scheffe procedure. The result summary of the post hoc test is presented in Table 4:2:2:7b below.

Table 4:2:2:7b: Summary of Scheffe test on the means for the different hospitals

(I) Hospital	(J) Hospital	Mean Difference (I-J)	Std. Error	Sig.
FMC Makurdi	FMC Bida	-.02849	.05167	.998
	FMC Birnin Kudu	-.08996	.05527	.754
	FMC Katsina	-.38594(*)	.05454	.000
	ATBUTH Bauchi	-.30121(*)	.05553	.000
	FMC Yola	-.64206(*)	.05553	.000
FMC Bida	FMC Makurdi	.02849	.05167	.998
	FMC Birnin Kudu	-.06146	.05354	.933
	FMC Katsina	-.35744(*)	.05279	.000
	ATBUTH Bauchi	-.27271(*)	.05381	.000
	FMC Yola	-.61357(*)	.05381	.000
FMC Birnin Kudu	FMC Makurdi	.08996	.05527	.754
	FMC Bida	.06146	.05354	.933
	FMC Katsina	-.29598(*)	.05632	.000
	ATBUTH Bauchi	-.21125(*)	.05728	.020
	FMC Yola	-.55210(*)	.05728	.000
FMC Katsina	FMC Makurdi	.38594(*)	.05454	.000
	FMC Bida	.35744(*)	.05279	.000
	FMC Birnin Kudu	.29598(*)	.05632	.000
	ATBUTH Bauchi	.08473	.05657	.814
	FMC Yola	-.25612(*)	.05657	.001
ATBUTH Bauchi	FMC Makurdi	.30121(*)	.05553	.000
	FMC Bida	.27271(*)	.05381	.000
	FMC Birnin Kudu	.21125(*)	.05728	.020
	FMC Katsina	-.08473	.05657	.814
	FMC Yola	-.34085(*)	.05753	.000
FMC Yola	FMC Makurdi	.64206(*)	.05553	.000
	FMC Bida	.61357(*)	.05381	.000
	FMC Birnin Kudu	.55210(*)	.05728	.000
	FMC Katsina	.25612(*)	.05657	.001
	ATBUTH Bauchi	.34085(*)	.05753	.000

*** The mean difference is significant at the 0 .05 level.**

Table 4:2:2:7b showed that, Federal Medical Center, Makurdi have the least rating of the availability, of the Non-Pneumatic Anti-shock Garment and were significantly different from the rating of respondents in Federal Medical Centers, Katsina, Bauchi and Yola. There was no significant difference between the rating of the variable between the Federal Medical Center, Makurdi, Birnin Kudu and that of Bida. Between Bida and Birnin Kudu, no significant difference was observed. The three centers Makurdi, Bida and Birnin Kudu had the lowest ratings. And between ATBUTH, Bauchi, FMC, Katsina and FMC, Yola, no significant difference was observed in their ratings of the garment.

4.3 DISCUSSION

The study determined efficacy (availability, awareness, utilization and effectiveness) of the NASG for management of postpartum haemorrhage in tertiary hospitals in Northern Nigeria.

The results of the study revealed that non-pneumatic Anti-shock garment (NASG) is not available in tertiary hospitals of Northern Nigeria with an aggregate mean score of 2.32. Unavailability of the NASG in the tertiary hospital is a caterstrophy considering the promising effect of NASG in the management of postpartum haemorrhage, the resuscitation of women with obstetric shock and its reduction of maternal mortality. The result of the test of sub-hypothesis I revealed a significant availability of the NASG in the tertiary hospitals of Northern Nigeria.

The results might be linked to the statement of Ojengbede, et al. (2006) who stated that the NASG is available in some designated health centers through the efforts of the government and Pathfinder International. The result of the study contradicts the statement of Wilder (2009) who stated that Pathfinder equips secondary and tertiary health facilities. The rated scores of the respondents from the different hospitals revealed that availability differs between the hospitals. From comparative analysis on availability of the NASG, it was revealed that FMC Makurdi, FMC Birnin Kudu, FMC Bida were particularly affected by the non-availability of the garment.

The statistical analysis of the data collected for the study revealed that non-pneumatic anti-shock garment (NASG) is available within the tertiary hospitals in Northern Nigeria but strictly under the control of the hospitals' management. The assumed availability of the

garment which though under the strict control of the hospitals' management is based on the agreed awareness, utilization and the effectiveness which the respondents agreed were adequate in their respective hospitals. Therefore it could be said that the garment is not available in the open society of the studied area at the time of this survey.

The test of the seventh sub -hypothesis revealed that, Federal Medical Center, Makurdi have the least rating of the availability, of the Non-Pneumatic Anti-shock Garment and were significantly different from the rating of respondents in Federal Medical Centers, Katsina, Bauchi and Yola. There was no significant difference between the rating of the variable between the Federal Medical Center, Makurdi, Birnin Kudu and that of Bida. Between Bida and Birnin Kudu, no significant difference was observed. The three centers Makurdi, Bida and Birnin Kudu had the lowest ratings. And between ATBUTH, Bauchi, FMC, Katsina and FMC, Yola, no significant difference was observed in their ratings of the garment.

The finding here agrees with Ojengbede et.al., (2006) who stated that the NASG is not yet available in the open market but in some designated health centers through the efforts of the government and Pathfinder International. The result of the study contradicts Wilder (2009) who stated that Pathfinder equips secondary and tertiary health facilities of which the Tertiary hospitals are supposed to be part.

Considering the maternal mortality in some state of the Federation, the availability of the NASG is something that ought to be encouraged into the open society. For example, it is estimated that maternal mortality in Northern Nigeria is very high. It is well over 1000/100,000 life birth (NDHS, 2008). ADSEEDS, (2007) stated that Adamawa has a

maternal mortality rate of 2000 /100,000 live births, Jigawa state has maternal mortality rate of 2000/100,000 live births (Magashi, 2012), Kano state has maternal mortality rate of 1,600/100,000 live births (Galadanci, Idris, Sadauki & Yakasai, 2010), Benue has maternal mortality rate of 1000/100,000 live births (Mohammed, 2013). Katsina has maternal mortality rate of 927/100,000 live births (Fawole, 2012), Niger state has maternal mortality rate of 548/100,000 live births (Ibrahim, 2012). Bauchi state has maternal mortality rate of 1549/100,000 live births (USAID, 2013). It will not be acceptable to say that the Non-Pneumatic Anti-shock Garment is not available in this region of the country. In view of the fact that it is estimated that 34% of maternal mortality are caused by postpartum haemorrhage (WHO, 2010).Reduction of maternal mortality in this region will require availability of the non-pneumatic Anti-shock garment in all hospitals in addition to other strategies.

It was also observed in the study that awareness level of Doctors and Nurses in the hospitals concerning the Non-Pneumatic Anti-shock Garment was very high, and there was no significant deference between the two professionals in their awareness of the NASG. This result is rather encouraging because of the promising effect of NASG on the reduction of postpartum haemorrhage, the resuscitation of women with obstetric shock and its reduction of maternal mortality. Test of sub-hypothesis six also showed that there was no significant difference in the perceived awareness of Non-pneumatic anti-shock garment for management of postpartum haemorrhage between male and female nurses in tertiary hospitals of the Northern Nigeria.

This finding is line with Wilder (2009), who stated that the Pathfinder concentrates on training of providers on NASG in most health centres. The finding is agreement with

Pathfinder (2011) where it was reported that it has implemented training activities in seven states of Nigeria which include Kano, Katsina, Oyo, Lagos, Nasarawa, Ebonyi and Yobe. It also shows that the training programmes have built the awareness of the nurses and doctors. Training or awareness creation is expected to be supported with supply of the NASG in the health facilities .The awareness of the NASG by doctors and nurses of the tertiary hospitals is important looking at their roles as trainers of health manpower for the purpose of stepping down the knowledge to their trainee. Looking at responses to questionnaire items, the result reveal an aggregate mean score of 2.63 for question item 5 (you have had training on the NASG) this score means that almost half of the respondents did not have training, their awareness can be attributed to personal effort. Training need to extend to the whole region not merely selected states.

The results of the further revealed that doctors and nurses in the tertiary hospitals utilized the Non-Pneumatic Anti-shock Garment for the management of postpartum haemorrhage. The test of sub-hypothesis five also showed that there was no significant variability in this observation between the Doctors and Nurses. This finding is very encouraging because the garment holds high promise in the reduction of maternal death by reducing bleeding and also revitalizing women with obstetric shock. The result of the study agrees with Wilder (2009) who stated that in Nigeria, 31 facilities use the Non-Pneumatic Anti-shock Garment. Clinical trials by Mou-rad-yussif et al. (2010) carried out in Nigeria might have not included the tertiary hospitals used for this study but indication from this study clearly shows that the tertiary hospitals as well uses the garment.

The finding here collaborates the studies by Wilder (2009) and the advocacy of utilization of Non-Pneumatic Anti-shock Garment for postpartum haemorrhage by SOGON (2010)

and Pathfinder (2011). The unavailability of the NASG in the wider society however has become a clear barrier to the effective utilization of the NASG for postpartum haemorrhage.

The results of the study further revealed that, the NASG was perceived to be effective. It was however observed from the mean scores of the hospitals that the rating of the effectiveness of the NASG was basically on the level of agreement, since all the respondents from the different hospitals agreed that the garment was very effective for postpartum haemorrhage. This finding is consistent with Bressa (2004) on the efficacy of NASG which revealed that emergency hysterectomies for intractable uterine atony were reduced by 56%, severe morbidities were decreased by 81% and mortalities were reduced by 4%. It also supports the results of studies by Muller (2008) which revealed that most patients with severe shock regain consciousness and vital signs begin to recover with bleeding slowed.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

The purpose of the study is to determine the perceived efficacy of the Non-Pneumatic Anti-shock garment (NASG) in the management of postpartum haemorrhage in the tertiary hospitals of Northern Nigeria. Whether the doctors and nurses in tertiary hospitals of Northern Nigeria are aware of the Non-Pneumatic Anti-shock garment (NASG). if the Non-Pneumatic Anti-shock garment (NASG) is being utilized in the tertiary hospitals of Northern Nigeria. Whether the Non-Pneumatic Anti-shock garment (NASG)is effective on PPH. in tertiary hospitals of Northern Nigeria .

A descriptive design was used for the study**.** The population of this study consisted of doctors and nurses in the three geopolitical zones of Northern Nigeria. Sample size of 398 respondents was used. Sampling techniques used are stratified, random and purposive sampling technique. Respondents were purposefully sampled from labour ward, postnatal ward, gynae ward, antenatal, emergency ward and gynae outpatient department to serve as respondents for this study at a ratio of 1:4 doctors and nurses. The data collected was collated, coded and analysed. The Statistical Package Social Science (SPSS PC package) was used for the data analysis. Descriptive statistics of frequencies, percentages, mean and standard deviations were computed. The scores were then be subjected to one way analysis of variance (ANOVA) and comparative analysis was used to test the hypotheses at an alpha level of 0.05. A constant mean of 2.5 was used to ascertain the agreement or disagreement of respondents to the questionnaire items.

5.2 CONCLUSION

On the basis of the results obtained from this study, the following conclusions were drawn: NASG is significantly available in tertiary hospitals in Northern Nigeria. Nurses and Doctors in tertiary hospitals in Northern Nigeria are aware of the NASG for management of postpartum haemorrhage. NASG is utilized by Nurses and doctors in tertiary hospitals in Northern Nigeria for management of postpartum haemorrhage. NASG is perceived to be effective for management of postpartum haemorrhage by Nurses and doctors in the selected hospitals involved in the study. there IS no significant difference in the perceived awareness and utilization the of Non-pneumatic anti-shock garment for management of postpartum haemorrhage between Nurses and Doctors , also between Male and female Nurses in tertiary hospitals of the Northern Nigeria There is significant difference in the availability, of the NASG for management of postpartum haemorrhage among nurses and doctors in tertiary hospitals in Northern Nigeria.

5.3 RECOMMENDATIONS

On the basis of the findings of the study, the following recommendations were made:

1. Government should make the Non-Pneumatic Anti-shock garment (NASG) available in all hospitals in Northern Nigeria.
2. Government should set up mechanisms to enhance the utilization of Non-Pneumatic Anti-shock garment (NASG) for the management of postpartum haemorrhage (PPH) in Northern Nigeria.
3. Doctors and nurses should incorporate the Non-Pneumatic Anti-shock garment in to medical and nursing training curricula .

5.4 SUGGESTIONS FOR FURTHER STUDIES

Interventional studies about the effectiveness of Non-Pneumatic Anti-shock garment (NASG) should be carried out in all hospitals in Northern Nigerian.

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APPENDIX I

QUESTIONNAIRE

Department of Physical & Health Education
Faculty of Education,
Ahmadu Bello University,
Zaria.

Dear respondents,

INTRODUCTION

The researcher is a PhD student of Department of physical and health education; she is conducting a research on "**Availability, awareness, utilization and effectiveness of Non-pneumatic Anti shock garment (NASG) on postpartum hemorrhage in Northern Nigeria**". In this regard, she seeks your cooperation to honestly respond to these statements. Your response should best describe your feeling to each statement relating to the research topic. All information obtained from this questionnaire will be kept strictly confidential and be used only for research purpose.

Thank you.

Addakano B. Umar

Sign

INSTRUCTION: Tick as appropriate [-/]

SECTION A: BIO DATA:

1. Age (in years)

a. 19 – 24 [ ]

b. 25 – 29 [ ]

c. 30 – 34 [ ]

d. 35 – 39 [ ]

e. 40+ [ ]

2. GENDER

a. Male [ ]

b. Female [ ]

4. PROFESSION

a. Nurse/Nurse Midwife [ ]

b. Doctor [ ]

5. HOSPITAL

a. FMC Makurdi [ ]

b. FMC Bida [ ]

c. FMC Birnin Kudu [ ]

d. FMC Katsina [ ]

e. ATBUTH Bauchi [ ]

f. FMC Yola [ ]

KEY:

SA: STROGLY AGREED **D: DIS AGREED**

A: AGREED **SD: STROGLY DISAGREED**

SECTION B: STATEMENTS ON AVAILABILITY OF NON-PNEUMATIC ANTI-SHOCK GARMENT (NASG)

S/N	**STATEMENTS**	**SA**	**A**	**D**	**SD**
1	The Non-Pneumatic Anti-shock Garment (NASG) is always available in the hospital.				
2	The Non-Pneumatic Anti-shock garment (NASG) is provided freely for use on patients by the hospital management.				
3	The Non-Pneumatic Anti-shock Garment (NASG) is Available in the open market.				
4	There are two Non-Pneumatic Anti-shock Garment (NASG) available in your hospital				
5	The Non-Pneumatic Anti-shock Garment (NASG) is available in different sizes.				
6	The Non-Pneumatic Anti-shock Garment (NASG) available in your hospital is a free size.				
7	The patient does not have to have the Non-Pneumatic Anti-shock Garment (NASG).				

SECTION C: STATEMENTS ON AWAERNESS OF THE NON-PNEUMATIC ANTI-SHOCK GARMENT (NASG)

S/N	STATEMENTS	SA	A	D	SD
1	The Non-Pneumatic Anti-shock Garment is a light weight washable and inexpensive garment.				
2	The Non-Pneumatic Anti-shock Garment is stretchable				
3	The Non-Pneumatic Anti-shock Garment is a device for resuscitating patient from shock				
4	Every health care personnel should know about the use of the Non-Pneumatic Anti-shock Garment (NASG).				
5	You have had training on the Non-Pneumatic Anti-shock Garment (NASG).				
6	When applied on a patient, the Non-Pneumatic Anti-shock Garment applies a circumferential pressure.				
7	A patient with the Non-Pneumatic Anti-shock Garment (NASG) on can undergo any investigation to find out the cause of the haemorrhage.				

SECTION D: STATEMENTS ON UTILIZATION OF NON-PNEUMATIC ANTI-SHOCK GARMENT (NASG) FOR POSTPARTUM HEAMORRHAGE

S/N	**STATEMENTS**	**SA**	**A**	**D**	**SD**
1	The Non-Pneumatic Anti-shock Garment is applied on patients with obstetric shock by any trained health care personnel.				
2	The Non-Pneumatic Anti-shock Garment can be applied on patients from the lower limps, thighs, pelvic region and abdomen.				
3	You have applied the Non-Pneumatic Anti-shock Garment can be applied on patients before				
4	The Non-Pneumatic Anti-shock Garment stops bleeding and thus prevents surgery.				
5	The Non-Pneumatic Anti-shock Garment resuscitates a patient in shock.				
6	A single Non-Pneumatic Anti-shock Garment can be used 50- 100 times.				
7	Non-Pneumatic Anti-shock Garment is used as an obstetric first aid device and not treatment.				

SECTION E: STATEMENTS ON EFFECTIVENESS OF NON-PNEUMATIC ANTI-SHOCK GARMENT (NASG) ON POSTPARTUM HEAMORRHAGE.

S/N	**STATEMENTS**	**SA**	**A**	**D**	**SD**
1	When Non-Pneumatic Anti-shock Garment (NASG) is placed on women, reduces bleeding.				
2	Non-Pneumatic Anti-shock Garment (NASG) reduces the rate of surgery when applied.				
3	Morbidity and mortality is reduced through the use of Non-Pneumatic Anti-shock Garment (NASG).				
4	Non-Pneumatic Anti-shock Garment (NASG) when applied keeps the patient alive while being transported to a hospital.				
5	Non-Pneumatic Anti-shock Garment (NASG) stabilizes patient while trying to look for the cause of bleeding.				
6	Non-Pneumatic Anti-shock Garment (NASG) is very effective in postpartum hemorrhage.				
7	Non-Pneumatic Anti-shock Garment (NASG) when applied, translocate 1.5 to 2 litres of blood from lower limps ,lower abdomen to the vital centers				

APPENDIX II

LIST OF FEDERAL HOSPITALS IN NIGERIA

A) FEDERAL TEACHING HOSPITALS

S/N	NAME OF HOSPITAL	STATE
1	Ahmadu Teaching Hospital Zaria	Kaduna
2	Aminu Kano Teaching Hospital Kano	Kano
3	Federal Specialist Teaching Hospital ,Imua	Edo
4	Jos University Teaching Hospital Jos	Plateau
5	Lagos University Teaching Hospital Idi-Araba	Lagos
6	Nnamdi Azikwe University Teaching Hospital,Nnewi	Anambra
7	Obafem Awolowouniversity Teaching Hospital,Ile-Ife	Osun
8	University of Abuja Teaching Hospital,Gwagwalada	FCT
9	University of Benin Teaching Hospital,Benin city	Edo
10	University of Calabar Teaching Hospital,Calabar	Cross-river
11	University College(Teaching) Hospital,Ibadan	Oyo
12	University of Ilorin Teaching Hospital,Ilorin.	Kwara
13	University of Maidugury Teaching Hospital,Maiiduguri	Borno
14	University of Nigeriateaching hospital,Enugu	Enugu
15	University of Port-Harcourt Teaching Hospital,Port-Harcourt	Rivers
16	Usman Danfodio University Teaching Hospital,Sokoto	Sokoto
17	Tafawa Balewa University Teaching Hospital,Bauchi	Bauchi

SOURCE: Strategic Planning and the Federal Tertiary Health Institutions: vol.1-3(FMHO,2009)

B) FEDERAL MEDICAL CENTERS

S/N	NAME OF HOSPITAL	STATE
1	Federal Medical Center,Umuahia	Abia
2	Federal Medical Center,Yola	Adamawa
3	Federal Medical Center,/Univesity of Uyo Teching, Hosp.	Akwaibom
4	Federal Medical Center,Azare	Bauchi
5	Federal Medical Center,Yenogoa	Bayelsa
6	Federal Medical Center,Makurdi	Benue
7	Federal Medical Center,Asaba	Delta
8	Federal Medical Center,Abakiliki	Ebonyi
9	Federal Medical Center, , Ido-Ekiti	Ekiti
10	Federal Medical Center Gombe	Gombe
11	Federal Medical Center, , Owerri	Imo

12	Federal Medical Center, Birninkudu	Jigawa
13	Federal Medical Center, Katsina	Katsina
14	Federal Medical Center,Birninkkebbi	Kebbi
15	Federal Medical Center,Lokoja	Kogi
16	Federal Medical Center,Ebutte-Meta	Lagos
17	Federal Medical Center,Keffi	Nasarawa
18	Federal Medical Center,Bida	Niger
19	Federal Medical Center,Abeokuta	Ogun
20	Federal Medical Center,Owo	Ondo
21	Federal Medical Center,Jalingo	Taraba
22	Federal Medical Center,Nguru	Yobe
23	Federal Medical Center,Gusau	Zanfara

SOURCE: Strategic Planning and the Federal Tertiary Health Institutions: vol.1-3(FMHO,2009)

APPENDIX III

DISTRIBUTION OF HEALTH WORKERS IN NIGERIA AND PERCENTAGE FOR NORTHERN NIGERIA

Health Workers in Categories	Total Number in Nigeria	TOTAL percentage in Northern Nigeria	North Central %	North East %	North West %
Doctors	61770	21.14	9.73	4.06	8.35
Nurses/Midwives	220,890	40.57	16.4	11.65	13.52
Radiographers	840	11.06	1.43	3.66	5.97
Pharmacists	13,198	31.43	19.94	3.8	7.79
Physiotherapist	1,473	21.85	10.8	2.73	8.32
Medical Laboratory Sciences	12,703	12.14	6.82	1.72	3.6
Environmental& Pub, HW	4,280	39.60	9.39	11.27	18.94
Health Record Officers	1,187	39.79	13.34	4.85	11.6
Dental Technologies	505	26.02	14.08	5.92	5.92
Dental Therapists	1,102	45.36	13.19	10.29	21.88
Pharmacy Technician	5483	33.29	6.17	9.12	18

Source: WHO & GHWA (2008), National Bureau of Statistics (2010).

APPENDIX IV

Distribution of health facilities and Doctors/ Nurses in Northern Nigeria.

Zone	States	*No.of facilities	**Estimated No. of Doctors/Nurses	***No. of Doctors/ Nurses Per zone
NORTH EAST	Adamawa	297	4784	28212
	Bauchi	416	4764	
	Borno	421	4874	
	Gombe	244	4274	
	Taraba	790	4240	
	Yola	360	4274	
NORTH WEST	Jigawa	389	4320	34982
	Kaduna	541	6320	
	Kano	297	5320	
	Katsina	138	4220	
	Kebbi	360	5060	
	Sokoto	352	4920	
	Zamfara	297	5320	
NORTH CENTRAL	Abuja	208	6088	42316
	Benue	297	6442	
	Kogi	662	7230	
	Kwara	580	6340	
	Nasarawa	297	6230	

	Niger	523	6440	
	Plateau	297	6250	

SOURCE: * Northern Govt. Health Submit, FMOH and UNICEF 2007.

**** Estimates by researcher**

***** National Bureau of statistics 2010**

Appendix V

SAMPLE SIZE SELECTION CHART

Recommended sample sizes for two different precision levels					
	Sample Size			Sample Size	
Population size	5%	10%	Population size	5%	10%
10	10		275	163	74
15	14		300	172	76
20	19		325	180	77
25	24		350	187	78
30	28		375	194	80
35	32		400	201	81
40	36		425	207	82
45	40		450	212	82
50	44		475	218	83
55	48		500	222	83
60	52		1000	286	91
65	56		2000	333	95
70	59		3000	353	97
75	63		4000	364	98
80	66		5000	370	98
85	70		6000	375	98
90	73		7000	378	99
95	76		8000	381	99
100	81	51	9000	383	99
125	96	56	10000	385	99
150	110	61	15000	390	99
175	122	64	20000	392	100
200	134	67	25000	394	100
225	144	70	50000	397	100
250	154	72	100000	398	100

SOURCE: ISAAC AND MICHAEL, 1981; SMITH, MF, *1983*

APPENDIX VI

ZONES ,STATES, SELECTED STATE , TERTIARY HOSPITALS AND POPULATION OF DOCTORS AND NURSES IN NORTHERN NIGERIA

ZONES	STATES/ZONE	SELECTED STATE AND TERTIARY HOSPITAL	POPULATION OF DOCTORS AND NURSES	POPULATION OF DOCTORS AND NURSES	DOCTOR/NURSE RATIO 1:4	
NORTH EAST	Adamawa	Adamawa state FMC Yola	368	60	12	48
	Borno					
	Bauchi					
	Gombe	Bauchi state ATBUTH Bauchi	372	59	11	48
	Taraba					
	Yola					
NORTH WEST	Zamfara	Katsina state FMCKatsina	423	53	11	42
	Kaduna					
	Kano	Jigawa state FMC Birninkudu	370	66	13	53
	Katsina					
	Kebbi					
	Sokoto					
	Jigawa					
NORTH CENTRAL	Abuja	Benue state FMC Makurdi	389	80	16	64
	Benue					
	Kogi					

	Kwara Nasarawa Niger Plateau	Niger state FMC Bida	401	80	16	64
TOTAL	**20**	**6**	**2,321**	**398**	**79**	**319**

SOURCE: FIELD SURVEY

APPENDIX VI I

POPULATION OF DOCTORS AND NURSES IN SELECTED TERTIARY HOSPITALS OF NORTHERN NIGERIA

S/NO	FACILITY	NO.OF DOCTORS	NO.OF NURSES	TOTAL
1	FMC YOLA	108	260	368
2	ATBUTH BAUCHI	100	262	362
3	FMC KATSINA	113	310	423
4	FMC BIRNINKUDU	98	272	370
5	FMC MKURDI	145	253	398
6	FMC BIDA	156	234	390
7	TOTAL	720	1,6601	2,321

SOURCE: FIELD SURVEY

APPENDIX VIII

RESEARCH PARTICIPANT INFORMED CONSENT FORM**Title**: Availability, awareness, utilization and effectiveness of Non-Pneumatic Anti-Shock Garment

(NASG) on postpartum hemorrhage in tertiary hospitals in Northern Nigeria.
Principal Investigator: Addakano Bello Umar (PhD/Educ/3678/2009-2010)

Faculty of education, Department of physical and health education ,Ahmadu Bello University Zaria.**Purpose of Research** is to assess the Availability, awareness, utilization and effectiveness of Non-Pneumatic Anti-Shock Garment (NASG) on postpartum hemorrhage in a tertiary hospitals in Northern Nigeria.

Procedure to be followed: You will be ask to answer a 33 question survey. The survey should take you no more than 30 minutes to complete. This include five questions on your demographic data, and 28 statements in four sections rated on a four-point likert scale related to Availability, awareness, utilization and effectiveness of Non-Pneumatic Anti-Shock Garment (NASG).

Discomforts/risks: The risks in this study are minimal (i.e., no greater than those ordinarily encountered in daily life or the performance of routine physical or psychological examinations or tests).

Incentives/benefits for participation: Participants will receive no incentives. Furthermore, all participants have the opportunity to contribute to the field of research. The research itself will benefit knowledge on Availability, awareness, utilization and effectiveness of Non-Pneumatic Anti-Shock Garment (NASG) in tertiary hospitals of northern Nigeria.

Time duration of participation: Participation in the study will not exceed 30 minutes.

confidentiality: Records will be kept confidential and will be available only to professional researchers and staff for the purpose of this study. If the results of this study are published, the data will be presented in group form and individual participants will not be identified.

Voluntary participation: Your participation is voluntary. If you believe you have been in any way coerced into participation, please inform the researcher. Also, you may choose not to answer any question(s) that makes you uncomfortable.

Termination of participation: You may choose to withdraw from the study at any time, Without any penalty.

I HAVE HAD THE OPPORTUNITY TO READ THIS **CONSENT FORM**, ASK QUESTIONS ABOUT THE RESEARCH PROJECT AND AM PREPARED TO PARTICIPATE IN THIS PROJECT

Researcher's Signature Date----------

_____

SUPERVISOR'S Name _Prof. C.O. Adegbite___

SUPERVISOR'S Signature Date----------

APPENDIX IX

DEPARTMENT OF PHYSICAL AND HEALTH EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA - NIGERIA
(OFFICE OF THE HEAD OF DEPARTMENT)

Vice-Chancellor: PROFESSOR ABDULLAHI MUSTAPHA, *B.Sc. (Hons) Pharm. (A.B.U), Ph.D. (London), FPSN*
Head of Department: PROFESSOR C. E. DIKKI, *NCE, B.Sc.Ed., M.Ed., Ph.D. (ABU)*

Our Ref: Ph.D/Educ/3678/2009-2010 Date: 22nd November, 2012

Your Ref: _____

Dear Sir,

INTRODUCTION OF COLLECTION OF DATA –
ADDAKANO BELLO UMAR (Ph.D/Educ/3678/2009-2010)

The bearer is a postgraduate student of this Department, and she is currently conducting a research on **"Availability, Awareness, Utilization and Effectiveness of the Non-Pneumatic Antishock Garment in Tertiary Hospitals of Northern Nigeria"** in which your hospital has been selected for data collection.

In this regard, I wish to request for your kind permission and support to use your hospital to collect data for her Ph.D research.

Please assist her.

Thanking you.

Prof. (Mrs.) T.N. Ogwu
Supervisor

APPENDIX X

DEPARTMENT OF PHYSICAL AND HEALTH EDUCATION
AHMADU BELLO UNIVERSITY, ZARIA - NIGERIA
(OFFICE OF THE HEAD OF DEPARTMENT)

Vice-Chancellor: PROFESSOR ABDULLAHI MUSTAPHA, B.Sc. (Hons) Pharm. (A.B.U), Ph.D. (London), FPSN
Head of Department: PROFESSOR C. E. DIKKI, NCE, B.Sc.Ed., M.Ed., Ph.D. (ABU)

Our Ref: Ph.D/Educ/3678/2009-2010 Date: 22nd November, 2012

Your Ref:

THE CHIEF MEDICAL DIRECTOR,
ABUBAKAR TAFAWA BALEWA
UNIVERSITY TEACHING
HOSPITAL BAUCHI.

Dear Sir,

INTRODUCTION OF COLLECTION OF DATA –
ADDAKANO BELLO UMAR (Ph.D/Educ/3678/2009-2010)

The bearer is a postgraduate student of this Department, and she is currently conducting a research on **"Availability, Awareness, Utilization and Effectiveness of the Non-Pneumatic Antishock Garment in Tertiary Hospitals of Northern Nigeria"** in which your hospital has been selected for data collection.

In this regard, I wish to request for your kind permission and support to use your hospital to collect data for her Ph.D research.

Please assist her.

Thanking you.

Prof. (Mrs) F.N. Ogwu
Supervisor

A CMAC By CMD
I recommend for the approval of the above Dts.
13/12/12

Chairman Committee
Pls treat
14/12/12
Refer to the Ethical Committee
17/12/12

APPENDIX XI

FROM THE OFFICE OF THE MEDICAL DIRECTOR
FEDERAL MEDICAL CENTRE KATSINA
Murtala Mohammed Way, (Jibia Bypass) P.M.B. 2121, Katsina.
☎ 065-434970, 434972, 433927. Fax: 065-434971.
Website: www.fmckat.4t.com
Email: fmckatsina@yahoo.com

27th December, 2012.

Umar Addakano Bello,
Department of Physical & Health education,
Ahmadu Bello University Zaria,
Kaduna.

ETHICAL APPROVAL FOR STUDY: AVAILABILITY, AWARENESS, UTILIZATION AND EFFECTIVENESS OF NON-PNEUMATIC ANTISHOCK GARMENT ON POSTPARTUM HAEMORRHAGE IN TERTIARY HOSPITALS OF NORTHERN NIGERIA.

Referring to your proposal submitted on above study to be conducted in Federal Medical Centre, Katsina as one of the study centre.

The ethical Committee has reviewed the proposal and approval has been given for the conduct of this study in the centre. But note that you should include verbal informed consent from participant in your methodology.

I wish you all the best.

IBRAHIM A. UMAR
ERC SECRETARY

APPENDIX XII

FEDERAL MEDICAL CENTRE, YOLA

Lamido Zubairu Road, P.M.B 2017, Yola Bye-Pass Yola Town, Adamawa State.

(Office of the Medical Director)

Medical Director
Dr. A. Danburam MBBS, FWACP, FCIPAG

FMCY/SUB/96/T/118

3rd January, 2013

The Head of Department,
Department of Physical and Health Education
Ahmadu Bello University Zaria
Nigeria

RE: INTRODUCTION OF COLLECTION OF DATA IN RESPECT OF ADDA KANO BELLO UMAR

I am directed to convey management's approval for the above mentioned student to carryout her research in the Centre, titled: Availability, Awareness, Utilization and Effectiveness of the Non Pneumatic Antishock Garment in Tertiary Hospital in Northern Nigeria.

Thank you.

Mrs. Binta Rajab Sanusi
For: Medical Director

Website: www.fmcyola.com.ng 075 - 635081 +234(0)8035383823

APPENDIX XIII

FEDERAL REPUBLIC OF NIGERIA

FEDERAL MEDICAL CENTRE MAKURDI

HOSPTIAL ROAD, MAKURDI, BENUE STATE

P.M.B. 102004

E-mail: fmcmkd@yahoo.com

Ref. No. FMH/FMC/MED.108/VOL.I/130

Date: 28th February, 2013.

Umar, Addakano Bello,
Department of Physical and Health Education,
Ahmadu Bello University,
Zaria.

ETHICAL LETTER OF APPROVAL

On the directives of the Management of this hospital, the committee on Ethical Review Board of the hospital sat on 28/2/13 to consider your study proposal "Availability, Awareness, Utilization and Effectiveness of Non-Pneumatic Antishock Garment of Post Partum Haemorrhage in Tertiary Hospitals of Northern Nigeria".

After going through your submitted protocols, consent forms and other information materials, the committee did not see any adverse ethical problem arising from your study.

You are hereby permitted to go on with the study.

Note that a copy of your final work must be made available to this committee on completion of your work.

Congratulations.

01.03.13

DR. INUNDUH, M. P. ***MBBS, FWACS***
Head of Clinical Services
Chairman Ethical Review Board

01/03/13

MRS. ALOCHA, R. I.
Secretary Ethical Review Board

APPENDIX XIV

FEDERAL REPUBLIC OF NIGERIA

FEDERAL MEDICAL CENTRE MAKURDI

HOSPTIAL ROAD, MAKURDI, BENUE STATE

P.M.B. 102004

E-mail: fmcmkd@yahoo.com

Ref. No: FMH/FMC/MED.108/VOL.V/131

Date: 28th February, 2013.

The HOD, Medical Records,
Federal Medical Centre,
Makurdi.

LETTER OF INTRODUCTION IN RESPECT OF UMAR ADDAKANO BELLO

I formally write to introduce Umar, Addakano Bello of Ahmadu Bello University, Zaria, Department of Physical and Health Education, carrying out his research on Availability, Awareness, Utilization and Effectiveness of Non-Pneumatic Antishock Garment of Post Partum Haemorrhage in Tertiary Hospitals of Northern Nigeria".

The Ethical Review Board after scrutinizing his project resolved that he should be given access to HOD Lab of Federal Medical Centre, Makurdi to assist him in his studies for the successful conduct of his research, please.

DR. INUNDUH, M. P. 01-03-13
Head of Clinical Services
Chairman Ethical Review Board

cc:
Umar Addakano Bello

Above for your information, please.

DR. INUNDUH, M. P. 01.03.13
Head of Clinical Services
Chairman Ethical Review Board

APPENDIX XV

FEDERAL MEDICAL CENTRE

BIRNIN KUDU, JIGAWA STATE

P.M.B 1022 Birnin Kudu Tel:064 - 261009

Our Ref: FMC/HREC/APP/CLN/001/1/5 Date: 04th April 2013

Addakano Bello Umar
Department of Physical and Health Education
Ahmadu Bello University
Zaria

Madam,

RE: PERMISSION TO COLLECT DATA

Sequel to your proposal submitted to Health Research Ethic Committee to conducted a study on "Availability, Awareness, Utilization and Effectiveness of Non-Pneumatic Antishock Garment on Postpartum Haemorrhage in Tertiary Hospitals of Northern Nigeria" to conduct in Federal Medical Centre, Birnin kudu as one of the study centre.

I am directed to write and inform you that your application was approved.

But note that you should liaise with Obstetrics and Gynaecology Department of the Centre; also you should be reporting the progress of your study to the committee.

Best regards.

U. A. Yandu
Secretary HREC
For: Medical Director

APPENDIX XVI

FEDERAL MEDICAL CENTRE, BIDA

P.M.B. 14, Bida, Niger State, Nigeria.
Website: www.fmcbida.org.ng
E-mail: fmcb@yahoo.co.uk
Tel: 066-461021 Fax:

Our Ref: Date: 21/10/2013

Addakano Bello Umar,
Department of Physical and Health Education
Ahmadu Bello University
ZARIA

Dear Umar,

ETHICAL APPROVAL FOR RESEARCH PROPOSAL

This is to convey to you that your Research Proposal titled "Availability, Awareness, Utilization and Effectiveness of the NASG on PPH in Tertiary Hospitals of Northern Nigeria" is hereby approved.

The Committee wishes you success in the conduct of your Research.

Yours Sincerely,

Adefemi, J. A. (Mrs)
Secretary
FOR: Chairman, Research, Ethics & Review Committee