Adverse Maternal outcomes: A concept analysis

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Abstract

Obstructed labor is a common cause of maternal and neonatal morbidity and deaths worldwide. It is responsible for up to 8% of maternal deaths in the world. Other causes of maternal deaths such as postpartum hemorrhage and puerperal sepsis are closely linked to the abnormal course of labor. Postpartum hemorrhage is a cause for 10-60% of maternal deaths globally (Salama et al, 2010).According to Zimbabwe Demographic Survey, (2010-2011) maternal mortality ratio was 960 and now currently 614 according to Multi Indicator Cluster Survey, (2014). The purpose of this article is to analyse the concept of adverse maternal outcomes and explore implications for practice using Walker and Avant's eight step approach analysis. The major defining attributes

that were identified were undesirable, unfavourable, harmful, severe, life threatening outcomes such as antepartum haemorrhage, postpartum haemorrhage, eclampsia and obstructed labour and these require accurate diagnosis as well as urgent intervention. Some of the identified antecedents were extreme maternal age, unbooked for antenatal services, pregnancy induced hypertension, socioeconomic factors, cephalo-pelvic disproportion and malpresentation. Common cited consequences were renal failure, disseminated intravascular coagulation, hypovolemic shock and maternal death The study findings are of significance in future research studies and the need to strengthen interventions that reduce the occurrence of maternal adverse outcomes

Key words:

Adverse maternal outcome, concept analysis, maternal death, pregnancy

Introduction

The term ‘adverse maternal outcome’ is used frequently in midwifery care practice. However, this term is not very well defined and is perceived differently. The variations in the definition of adverse maternal outcome results in negative impact, for example there is no standardization .This has made it difficult to put in place indicators for easy identification of the adverse maternal outcome. In turn this will facilitate a rapid response by the nurses and doctors in order to reduce maternal morbidity and mortality. Also the referral system is strengthened and high risk cases are referred early for further management to the next health level. Decision making is improved by the relevant health service providers and the three delays are curbed .The three delays contribute to relatively high incidence of maternal deaths these are delay in making a decision to seek treatment, delay in reaching a health facility and delay in getting appropriate

help after reaching a health facility. Hence midwives, doctors, obstetrician and other relevant personnel are responsible for reduction of adverse maternal outcome but there is lack of clarity on how this should be achieved (MOH&CC, 2013).

The purpose of this concept analysis is to bring clarity on the term adverse maternal outcome by examining the various ways it is used in the health care system and other disciplines. Clarification of the term will help those providing services to communicate with each other, with patients and significant others on importance of prevention of adverse maternal outcome in turn this will result in reduction of maternal morbidity and mortality. Clarification of the concept will also help guide on provision of timeously appropriate management of the pregnant women during antenatal intrapartum and postpartum period. The concept analysis will facilitate clarification of the term and enhance unambiguous communication among health care workers attending to women in the perinatal period.

Methodology

Walker and Avant approach was used to conduct the concept analysis. The following steps were taken to develop the concept analysis .Initially the concept adverse maternal outcome was selected and the purpose of analysis was determined .All uses of the concept were identified from the dictionary, medical literature and other disciplines as well as the attributes /characteristics of the concept .A model case- a real life example which includes all the critical attributes was developed. Relevant literature was reviewed in order to get different meaning of the term. Different literature data bases were used to search the literature that is PubMed, Google Scholar. Search terms used were adverse maternal outcome, obstructed labour, antepartum hemorrhage postpartum hemorrhage, and eclampsia adverse outcomes. PubMed is designed to

facilitate efficient information by end users: scientist and clinicians (library.mssm.edu/tutorials/advantages.html). One of the advantages of using PLOS ONE is that one gets quick access to newly published articles. Google scholar provides a simple way to broadly search for scholarly literature. The period of search was from 2009 to 2016. Definition of terms was taken from dictionaries as well as medical literature for example Bennet & Brown (2013) and WHO (2016). A total of sixteen articles were used to search the relevant literature.

Table 1: Results reviewed literature

Number	Author	Year	Title/ Sample Population
1	Althabe, Moore, Gibbons, Berrueta, Goudar, Chomba, Derman, Patel, Saleem, Pasha, Esmai, Garces, Liechty, Hambidge, Krebs, Hibberd, Goldenberg, Khoso-Thomas, Cafferata,	2015	Adverse maternal and perinatal outcomes: The global Network manual

	Buekens & McClure.		
2	Fuchs, Bouyer, Rozenberg, & Senat.	2013	Adverse maternal outcomes associated with teenage pregnancies.
3	Izugbara & Ngilangwa.	2010	Women, poverty and adverse maternal outcomes in Nairobi.
4	Kabakyenga, Östergren, Turyakira, Mukasa, Pettersson, & Mori.	2011	Individual and health facility factors and the risk for labor and its adverse outcomes in south-west Uganda
5	Laopaiboon, Lumbiganon, Intarut, Vogel, & Gülmezoglu.	2014	Advanced maternal age and pregnancy outcomes
6	Liu, Avant, Aungsuroch, Zhang, & Jiang.	2014	Patient outcomes in the field of nursing: A concept analysis

7	Oteng-Ntim, Meeks, Seed, Webster, Howard, Doyle, & Chappell.	2016	Adverse maternal and perinatal outcomes in pregnant women with sickle cell disease.
8	Roberts, Ford, Algert, Bell, Simpson & Morris.	2009	Trends in adverse outcomes during child birth.
9	Bhandari, Raja, Shetty & Bhattacharya	2013	Maternal and perinatal consequences of antepartum hemorrhage of un known origin

Definition of terms

It is of vital importance to define adverse maternal outcome because at times some events are referred as adverse maternal outcome when they are not and at times some events are not considered to be adverse maternal outcome when they are supposed to be and this has a negative implications on the desired outcome. The term adverse maternal outcome does not appear in dictionaries as one word however “adverse” “maternal” and “outcome” can be found as one word.

Oxford English dictionary, (2010) define adverse as preventing success or development, harmful or unfavorable adverse effect on production. Similarly adverse is an unintended harmful event

according to the Mosby dictionary, (2013). According to Merriam-Webster advanced Leaners English Dictionary an outcome was defined as something that happens as a result of an activity or process. In this case it applies to the unfavourable result of a pregnancy. According to Liu, et al (2013) the DK Oxford illustrated English –Chinese dictionary states that an outcome is "a result; a visible result". The Longman contemporary English defines outcome as "the final result of a meeting, discussion, war, used especially when no one knows what it will be until it actually happens. The definition does not apply because it's not indicating the nature of outcome whether negative or positive.

Maternal definition as an adjective is referring to a mother; motherly or referring to a woman who has given birth (Segen's Medical Dictionary, 2012). According to WHO, (2016), maternal is defined as relating to a mother, especially during pregnancy or shortly after childbirth and maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. While motherhood is often a positive and fulfilling experience, for too many women it is associated with suffering, ill-health and even death. The major direct causes of maternal morbidity and mortality include haemorrhage, infection, high blood pressure, unsafe abortion, and obstructed labour. Mosby Medical Nurses Dictionary, (2013, p.863), states that adverse maternal outcome is associated with toxaemia of pregnancy, diabetes mellitus and some fetal disorders. This implies that adverse maternal outcome is undesirable events that happens to the pregnant woman during pregnancy and soon after child birth.

The world health Organisation, (2014), states that a maternal death is a an adverse maternal outcome and defined maternal death as the death of a woman who is pregnant or within 42 days of termination of pregnancy irrespective of duration site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental

causes. The definition is adequate because it covers both the direct and indirect causes of maternal deaths and included a time frame.

Attributes of adverse maternal outcomes:

According to Walker & Avant, (2011), critical attributes were defined as the characteristics of concepts that appear over and over again. These help researchers to differentiate the occurrence of a specific phenomenon from a similar one. The literature review helped us to identify attributes of adverse maternal outcome are unfavourable or undesirable, severe, life threatening and harmful outcome such as antepartum haemorrhage, obstructed labour, eclampsia and post-partum haemorrhage. Please note occurrence of one attribute can result in severe adverse maternal outcome for instance, maternal death. However the attributes may occur as more than one and hence also worsen the mother's condition. The conditions constituting adverse maternal outcomes are as follows; postpartum haemorrhage, antepartum haemorrhage, eclampsia and obstructed labour and maternal death (Roberts, L.C. 2009).

According to Bennett & Brown, (2013), antepartum haemorrhage (APH) was defined as bleeding from the birth canal after the 28th week of pregnancy and before the onset of labour. It can occur at any time until the second stage of labour is complete. The gestational age bleeding starts varies in other books states that antepartum is bleeding that starts as from 24 weeks.

World Health Organization, (2012), defines Postpartum Haemorrhage (PPH) as a blood loss of 500 ml or more within 24 hours after birth, while severe PPH is defined as a blood loss of 1000 ml or more within the same time. However bleeding of less than 500mls can cause deterioration of condition in case of other pre-existing maternal conditions like anaemia.

Regarding treatment, APH and PPH should be considered as obstetrical emergencies and medical attention should be sought immediately if inappropriate management is not given promptly it can lead to death of the mother and/or fetus in case of antepartum haemorrhage. According to International classification of disease (ICD) Postpartum haemorrhage was defined as haemorrhage of 500mls or more following a vaginal delivery or 750mls or more following a cesarean section. Only severe PPH (requiring a transfusion, procedure to control bleeding and or resulting in organ failure was included as adverse maternal outcome. Fuchs, F. et al (2013), defined a severe postpartum haemorrhage as persistent bleeding more than 500 cc requiring the use of prostaglandins, uterine artery embolization, internal iliac artery ligation or hemostatic hysterectomy. According to Ministry of Health and Child Care Zimbabwe, (2012), PPH is commonly defined as vaginal bleeding in excess of 500mls after vaginal child birth, but should also include any amount of blood loss that causes significant deterioration in a woman's hemodynamic status.

Preeclampsia/Eclampsia, is a life-threatening complication of pregnancy, is a condition that causes a pregnant woman, usually previously diagnosed with (high blood pressure and protein in the urine), to develop seizures or coma (eMedicineHealth, December 2012).

According to MOHCC, (2013), severe pre-eclampsia and eclampsia are managed similarly with exception that diagnostic criteria for pre-eclampsia is diastolic Blood Pressure (BP) 110mmHg or more and proteinuria 3+ or more. For eclampsia unconsciousness or convulsions (fits) and diastolic BP 110mmHg or more in a pregnant women or women who has recently given birth.

Kabakyenga, (2011), indicated that obstructed labour is failure of descent of the fetal presenting part in spite of adequate uterine contractions. It is a major cause of maternal morbidity and

mortality in low income countries and accounts for approximately 8% of maternal deaths globally. Studies in low-income countries have reported the prevalence of obstructed labour to be between 2% to 8% of all institutional deliveries. This is most likely an underestimate as the majority of maternal deaths due to obstructed labour as a primary cause of death are rarely documented.

Antecedents

Althabe et al, (2015), in a study to determine the adverse maternal and perinatal outcomes in adolescent's pregnancies stated that maternal education and parity are socioeconomic and reproductive factors of adverse pregnancy outcomes that are also associated with adolescent pregnancy. This means that lack of education and low socio economic status may predispose a pregnant woman to adverse maternal outcome. According to Rutaremwa et al, (2015), factors associated with maternal mortality in sub-Saharan Africa were related to prenatal care coverage and skilled attendance at delivery. On the other hand, failure to use maternal health services is one of the key antecedents of adverse maternal outcome. Pregnant women can fail to book for antenatal services when they do not have the money to book at the clinic. Currently in Zimbabwe the policy states that maternity fee is free but in certain institution pregnant women are required to pay. During prenatal care, women undergo screening and receive treatment for conditions that could be life-threatening. Poverty hampers women's ability to use otherwise available maternal care services. For instance, lack of resources to pay for transportation could frustrate access to quality care at critical moments (Izugbara & Ngilangwa, 2010).In turn this increase home deliveries and its consequences.

Recent decades have witnessed an increase in mean maternal age at childbirth in most high-resourced countries. Advanced maternal age has been associated with several adverse maternal (SMO) and perinatal outcomes (Khashan et.al, 2013).In agreement Laopaiboon et al' (2014) also states that maternal near miss based on markers of organ damage, maternal death and severe maternal outcome increased with maternal age as evidenced by the following statistics. The SMO ratio varied from 5/1000live births in women aged 20-34 years and up to 20/1000 lives births in women aged 45 years and older. They further states that advanced maternal age has been previously shown to increase the risk of gestational diabetes, antepartum haemorrhage and placenta praevia. These will in turn predispose the women to adverse maternal outcomes resulting in increased maternal morbidity and mortality.

According to Kabakyenga, et al (2011), the main obstetric causes of obstructed labour in low income countries include cephalopelvic disproportion, malposition and malpresentation. All the three can be detected during antenatal and a decision made on mode of delivery to prevent complications like ruptured uterus, vesico- vagina fistulae due to obstructed labour.

Consequences

According to Walker & Avant, (2011), consequences are "those events or incidents that occur as a result of the occurrence of the concept" Teela, et.al stated that Pre-eclampsia is a leading cause of maternal deaths. These deaths mainly result from eclampsia, uncontrolled hypertension, or systemic inflammation. The consequences of maternal adverse occur as a result of maternal complications like post-partum haemorrhage and this can lead to consequences like disseminated intravascular coagulation, anaemia, hypovolemic shock causing maternal morbidity and death. Roberts et al, (2014), also state that women with adverse outcome such as preeclampsia and

haemorrhage develop consequences such as acute renal failure, disseminated intra vascular coagulopathy and requires blood transfusion.it is very important to monitor intake and output when managing and both antepartum or postpartum haemorrhage to exclude renal failure. Eclampsia may cause maternal death due to intracerebral haemorrhage, pulmonary oedema and multi organ system failure (e.g., heart, liver and kidney.)

Obstructed labour may cause intra-uterine infection due to prolonged rupture of membranes, trauma to the bladder due to pressure from the fetal heard or as a result of injury at delivery. If no intervention is done for obstruction will result in a ruptured uterus due to excessive thinning of the lower segment. This leads to haemorrhage shock and may end in maternal death (Brown & Bennett, 2013). According to Thaddeus and Maine who presented the "Three Delays Model", the chain of factors affecting the outcome of obstructed labour in low-income settings include both cultural and socio-economic factors. Adherence to traditional childbirth practices and individual beliefs as well as poverty restricting the family's ability to pay for transport is directly related to delay in seeking health services.

Operational definition

Adverse maternal outcome is the occurrence of an unfavourable or undesirable, harmful, severe, life threatening outcome such as antepartum haemorrhage, postpartum haemorrhage, eclampsia, and obstructed labour during pregnancy and child birth and requires urgent intervention.

Empirical Referents

The empirical referents are classes or categories of actual phenomena that by their existence or presence demonstrate the occurrence of the concept itself (Walker and Avant, 2011). The defining attributes of the adverse maternal outcome concept are abstract, so we need empirical referents for the concept to make the concept measurable. The empirical reference will be described from within the definition of adverse maternal outcome in terms antepartum haemorrhage, postpartum haemorrhage, obstructed labour and eclampsia. Discussion on how each attribute is measured is provided below.

Antepartum haemorrhage- The nurse/ midwife will look for any signs of shock that is pallor and breathlessness. Pulse rate is assed usually it is rapid. Blood pressure becomes low, respiratory rate and temperature is also assed. Documentation is done. The midwife must assess the amount of blood loss in order to ensure adequate fluid replacement. Usually there is a challenge of measurement of blood loss for both antepartum and postpartum haemorrhage and nurses are encouraged to accurately measure blood loss including estimating blood on soiled linen. Also the nurses should find out how much blood was lost prior to admission .An amount of blood regarding antepartum warrants an emergent intervention. In case of antepartum as a result of placenta abruption the patient may have concealed bleeding which may lead to uterine enlargement in excess of gestation, abdomen hardy in consistency and guarding on palpation. Abdominal girth measurements are to be done whilst awaiting surgical intervention to monitor bleeding (Bennet& Brown, 2013).

PPH diagnoses included uterine atony, retained placenta or tissue, ruptured uterus, vaginal/cervical lacerations and placenta accrete therefore the examination of patient is critical to establish cause. Rapid assessment of the patient to assess visible bleeding at times the blood will be pouring and other signs present pallor, rising pulse rate, falling blood pressure and patient

may be restless or drowsy. Blood loss is measured by using a measuring jar and adding estimated blood loss, after birth blood is mixed with amniotic fluid and sometimes urine and often soaked in sanitary towels and linen making it difficult to measure. Full blood count will indicate a fall in haemoglobin level and bed side clotting test to rule out failure of clotting factors. The amount of blood loss is 500ml and above or any amount that cause deterioration in patient hemodynamic status (MOHCC, 2013).

Obstructed labour

Close monitoring of the patient using the partogram will reveal early signs of obstructed labour. The presenting part will fail to descent despite good uterine contractions. On vaginal examination the midwife notes that the cervix dilates slowly because no presenting part is applied on it. The vagina is hot and dry. Excessive moulding and caput succedaneum (oedema of soft tissue) is present. There is early rupture of membranes or elongated bag of fore waters. Full bladder or rectum is to be excluded because they may cause non-engagement of the presenting part. Late signs may be reflected by the state of the patient, she will be in pain, dehydrate and, ketotic, There is reduced urine output and may be blood stained due to damage to bladder because of obstruction. Abdominal examination may reveal a ridge (bandl's ring).Uterine contractions may cease due to exhaustion (Bennet and Brown, 2013).

Eclampsia

The diagnostic criteria of eclampsia will lead to accurate diagnosis. Blood Pressure (BP) 110mmHg or more and proteinuria 3+ or more is also considered. For eclampsia unconsciousness or convulsions (fits) and diastolic BP 110mmHg or more in a pregnant women or women who has recently given birth. Other causes of proteinuria should be excluded e.g.

urinary tract infection .Also differential diagnosis of other causes of convulsions like complicated malaria are ruled out. Eclampsia follows usually after the following signs (pre-eclampsia) a sharp rise in blood pressure, headache, epigastric pain, history of nausea and vomiting. Reduced urine output may be noticed due to affected renal function.

Model case

A model case is a "real life" example of the use of concept that includes all the critical attributes of the concept (walker & Avant, 2011).The following is an example model case. A 15 year-old pregnant adolescent was admitted in active labour at Muromo Rural Health Clinic. She came in company of her mother and she was an unbooked case (she did not register for antenatal). However on admission her vital signs were T: 36.4, P: 90 beats per/min, R: 20 breadths/min and BP was elevated 160/100, edematous limbs, proteinuria +++ and complaining of epigastric pain. She had a height of 147cm. Gestational age by dates –client was not sure of dates. Abdominal palpation, Symphsio fundal height (SFH)-38cm, lie –longitudinal, presentation cephalic, cervical dilatation was 4cm, and uterine contractions moderate 3per 10 minutes and heard descent 4/5 above pelvic brim. The midwife summoned for an ambulance to collect patient to the next level for further management meanwhile she commenced on antihypertensive. The ambulance delayed due to logistic challenges and arrived at the clinic after more than 4 hours. The clinic nurse had done another vaginal examination which indicated that labour was not progressing. On admission at the hospital patient started having convulsions. She was taken to the high dependent unit where she was managed and prepared for theatre for obstructed labour and elevated blood pressure. Cesarean section was performed and a fresh still birth was delivered. In addition the woman developed severe postpartum haemorrhage whilst still in

theater. Estimated blood loss was +2500mls, resuscitation done and blood transfusion commenced but all was in vain patient collapsed and died.

In this case the antecedents were that the pregnant had an extreme age (15years), unbooked, pre-existing maternal condition (Pregnancy induced hypertension) which was only discovered when in labour and there was a delay in getting transport to the next level. If the adolescent pregnant women had attended antenatal care the abnormalities would have been detected early and client referred for management. The attributes identified in this scenario are eclampsia, PPH and obstructed labour due to cephalopelvic disproportion. Consequences noted were convulsions, clotting failure due to low platelet count and this resulted in severe bleeding leading to hypovolemic shock and finally a maternal death. This maternal death was avoidable.

Borderline case

A borderline case has many of the same elements as a model case however one or more of the defining attributes differs in some way. It is closely connected to the case, but has some dissimilarity that makes it inherently distinguishable from the concept being studied (Walker & Avant, 2011). A 39 year old pregnant woman was admitted Harare hospital maternity unit as referral from Epworth clinic .with a history of severe vaginal bleeding, patient started that she was not in labor and not yet booked because of financial constraints. She had a previous history of pregnancy induced hypertension with the two previous pregnancies and she had a recent history of headaches, nausea, vomiting, epigastric, pain and at times blurred vision. On admission to hospital fetal heart rate was not dictated. Vital signs were BP; 140/90 P: 116beats /min, respirations were rapid. The pregnant was anxious, pale and visible blood loss was bright red suggestive that it has not been retained in the utero. Emergency measures were initiated to

rehydrate patient. Full blood count and blood for cross match collected to initiate blood transfusion. Patient was prepared and taken to theatre where a fresh still birth baby boy was delivered. Findings in theater were that the patient had placenta abruption. The baby was in a pool of blood estimated blood loss was 2000mls.Haemoglobin level was very low 5g/dl. Post cesarean section the patient was admitted in the high dependent unit for close monitoring. Transfusion of three units of whole blood was given and patient commenced on antibiotics as well as hypertensive drugs. She stayed long in hospital due to anaemia and she developed a septic suture line.

This borderline case demonstrates some of the attributes, antecedents and consequences of the adverse maternal outcome. The woman was above 35 years and this put her at a high risk of developing adverse maternal outcomes. A history of pregnancy induced hypertension with the previous pregnancy is strong suggestive that the cause of placenta abruption was elevated blood pressure. Also the patient was unbooked and the contributing factor was unavailable finances. The attributes in this case is antepartum haemorrhage and the pregnancy induced hypertension that could lead to eclampsia. Anaemia, sepsis, fresh still birth and long stay in hospital are consequences which in turn increase cost to the family and hospital.

Contrary case

According to Walker & Avant, (2011) Contrary cases are examples of "not the concept" A 26 year old pregnant woman was admitted in the labour ward in active labour. She had booked for antenatal clinic at 12 weeks gestational age and she managed to attend four subsequent visits according to the focused antenatal protocol. On admission vital signs were BP 130/80 mmhg pulse 84b/minute T-36 and R-18 breadths/min. Routine urinalysis done and there was no

proteins or glucose dictated. Maternal and fetal monitoring was done. All parameters were within normal range and labour progressed successfully with optimum health for both the mother and baby .Estimated blood loss was 200mls. Both mother and baby monitored during the fourth stage of labour to prevent adverse outcomes. This case is a contrary case because it does not relate anything to the concept under study.no adverse outcome occurred. The client booked early and managed to attend subsequent visits. This provides any opportunity for providing health promotion activities, plan for delivery, blood investigations, physical examination and provision of prophylaxis to prevent adverse pregnancy outcomes.

Conclusion

The purpose of the concept analysis was to clarify the term adverse maternal outcome. Adverse maternal outcome affects individuals as well as the entire families and community at large, therefore it is of vital importance to understand "adverse maternal outcome" in order to reduce its social, psychological and physical consequences. Understanding morbidity and mortality associated with these conditions should help providers understand the urgency of managing patients correctly and in a timely manner to avoid complications. For example a patient with severe PPH can die within 2 hours according to empirical evidence. The concept analysis has provided a definition, attributes, antecedents, consequences and empirical referents of adverse maternal outcomes. The discussion provided here facilitates clarification of the concept. Novel policies should be followed when defining adverse maternal outcomes.

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