



## Puerperal Sepsis; Concept Paper

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**ABSTRACT:** Puerperal sepsis accounts for 75 000 maternal deaths globally. It is the 4<sup>th</sup> cause of maternal death in Zimbabwe. There are varying definitions of puerperal sepsis by nurse/midwives and other health care providers hence the need to describe the concept.

**Objective:** The objective of the paper was to clarify the concept of interest by describing and assigning to it antecedents and attributes so as to enhance understanding among nurse/midwives and healthcare providers.

**Methodology:** The researcher used the ( Walker & Avant, 2011) eight steps model for concept analysis. Fifteen articles were analysed and ten were found to be relevant.

**Results:** The definition of puerperal sepsis is not clear among nurse/midwives and healthcare givers and hence the misdiagnosis of puerperal sepsis.

**Conclusion:** Definition of puerperal sepsis is critical for it translates to proper care and management of the condition.

**KEYWORDS:** Puerperal sepsis, maternal morbidity, maternal mortality.

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### I. INTRODUCTION AND BACKGROUND

Bacterial infections during labour and the puerperium are among the leading causes of maternal morbidity and mortality (WHO, 2015). According to World Health Organisation (WHO, 2015) puerperal sepsis is defined as infection of the genital tract occurring at any time between the onset of rupture of membranes or labour and the 42<sup>nd</sup> day postpartum in which two or more of the following are present: pelvic pain, fever ( oral temperature of 38.5 degrees celsius or higher on any given occasion), abnormal vaginal discharge, abnormal smell/foul odour discharge or delay in uterine involution (less than 2cm/day) during the first eight days.

This definition also has considerations for infections related to childbirth procedures or conditions, for example, caesarean section, episiotomy and perineal tears. Historically puerperal sepsis formerly known as childbed fever was a mystery. It was understood that wherever physicians went the disease became more prevalent. Puerperal sepsis has been a common pregnancy related condition, which could eventually lead to obstetric shock or even death. (Lalitha, n.d.) During the 18<sup>th</sup> century it took an epidemic proportion particularly when home practice changed to delivery lying in hospital, as there still was a total ignorance of sepsis (WHO, 2003).

Ignaz Semmelweis, a Hungarian Doctor who practised in 19<sup>th</sup> century Vienna is known and widely believed to be the father of modern infection control. He showed that puerperal sepsis was contagious and that it could be prevented by adequate hand hygiene (Gould, 2010).

Puerperal sepsis is one of the leading causes of preventable maternal mortality worldwide, and accounts for 15% of all maternal deaths (Buddeberg & Aveling, 2015). In a study done in Pakistan, puerperal sepsis was among the three leading causes of maternal death in both the hospital and community. In Europe and the Western countries, sepsis continues to be a major contributor to maternal deaths even though the rate of maternal deaths has drastically gone down. A review covering a period of twenty years , in Norway, on the number and causes of maternal deaths , puerperal sepsis accounted for four of the forty- seven deaths (10%) and was the 3<sup>rd</sup> cause of maternal deaths (Chisembele, 2004).

Although the reported incidence of puerperal sepsis in high income countries is relatively low (between 0.1 and 0.6/ 1000), it is still an important direct cause of maternal mortality (WHO, 2015). Case fatality for puerperal sepsis as high as 30 -50 % have been reported in low and middle income countries It is the 6<sup>th</sup> leading cause of disease burden, burden in women during their reproductive years (UNFPA, 2012). The wide incidence

range likely reflects the discrepancies in diagnostic criteria, lack of access to healthcare and incomplete case ascertainment.

Sub-Saharan Africa accounts for 56% of global maternal deaths (UNFP, 2012). In a study in Uganda, puerperal sepsis accounted for 30.9 % of maternal mortal(Ngonzi et al., 2016). In Kenya puerperal sepsis accounts for 15 % of all maternal deaths(Chepchirchir, Nyamari, & Keraka, 2017). South Africa has a significant burden of puerperal sepsis, which is its 4<sup>th</sup> leading cause of maternal mortality (Johnson & Buchmann, 2012). According to UNDP report of 2015, puerperal sepsis accounts for 7.8 % of all maternal mortality in Zimbabwe and is the 4<sup>th</sup> commonest cause of maternal mortality.

The risk factors of puerperal sepsis include: caesarean section, birth in non-hygienic conditions, low socio-economic status, poor nutrition, anaemia, first birth, prolonged rupture of membranes, multiple pelvic examinations during labour, instrumentation during delivery, retention of placental fragments in the uterus and postpartum haemorrhage(Williams, n.d.)

In a study at the Ife state hospital in Nigeria the predisposing factors associated with puerperal sepsis were anaemia 69.2 % of cases, prolonged labour (labour lasting more than 12hrs) 65.7%, frequent vaginal exams in labour ( more than 5 times) in 50% and prolonged rupture of membranes in 31.5 % (WHO Geneva, July 2003). (WHO,2010) lists risk factors of puerperal sepsis as poor aseptic technique, manipulations high in the birth canal, unrepaired cervical lacerations or large lacerations, pre-existing sexually transmitted infections, inadequate or no immunisation with Tetanus Toxoid and packing into the birth canal with traditional herbs.

The risk of developing puerperal sepsis are , 1-3% in normal vaginal deliveries, 5-15% in scheduled caesarean deliveries performed before labour begins, 15-20% in non-scheduled caesarean deliveries performed after labour begins. Additional factors include obesity, bacterial vaginosis (sexually transmitted infection), monitoring fetus internally, young age and colonisation of the vaginal tract with Group B Streptococcus bacteria (Nicholls-dempsey, Czuzoj-shulman, & Abenheim, 2018)

The main clinical features of puerperal sepsis are fever, lower abdominal pain or pelvis, foul smelling vaginal discharge, pallor, chills, feeling of discomfort or illness, headache, loss of appetite, and increased heart rate. Puerperal sepsis is preventable with provision of adequate antenatal care, referral and timely treatment of complications of pregnancy, promotional institutional delivery and postnatal care. Puerperal sepsis can cause long health problems such as pelvic inflammatory disease and infertility in females. Estimating the burden of puerperal sepsis among populations is problematic because of the differing definitions of puerperal sepsis and lack of follow-up(Hashmi & Khan, 2014). Most of the estimated 75 000 maternal deaths are recorded in low-income countries. Puerperal sepsis accounts for 1/10 of the global burden of maternal morbidities and mortalities.

## **II. PROBLEM STATEMENT**

Varying definitions of puerperal sepsis by different authors have led to misdiagnosis of the condition leading to detrimental effects to the woman. From the researchers' point of view puerperal sepsis diagnosis especially in remote health centres is zeroed on the presence of fever only without consideration also of obstetric signs and yet fever is a symptom manifested in most conditions like malaria or influenza.

## **III. SIGNIFICANCE OF THE CONCEPT PAPER**

The concept analysis will help in timely diagnosis of puerperal sepsis and its management. There will be comprehensive management of mothers based on an accurate impression or diagnosis of puerperal sepsis as well as accurate reporting of the prevalence of puerperal sepsis. Concept analysis of the term puerperal sepsis will help in the development of management protocol, monitoring and evaluation based on accurate indicators and programme planning.

## **IV. LITERATURE REVIEW**

The researchers conducted literature search from 1<sup>st</sup> July 2018 to 31<sup>st</sup> July 2018 using journals, Pubmed, Medline and Google Scholar search engines to select ten articles relevant to the concept. Fifteen articles were reviewed and ten were found relevant.

Author/Year	Source	Definition	Antecedents	Attributes	Overall comment
(Youngson, 2005)	Medical Dictionary	Infection in the female genital tract within ten days of childbirth, miscarriage or abortion. There is fever, LAP and ill-smelling vaginal discharge.	Present	Present	Antecedents and attributes, partially availed.
(World Health Organisation, 2015)	World Health organisation publications	Infection of the genital tract at any time between the rupture of membranes or labour and the 42 <sup>nd</sup> day postpartum in which two or more of the following are present: pelvic pain, abnormal vaginal discharge (for example presence of pus), abnormal smell or foul odour or vaginal discharge, fever (that is oral temperature 38 <sup>5</sup> degrees or higher on any given occasion) and delay in the contraction of the uterus (less than 2cm/day) delay during the first eight days.	Present	Present	Antecedents and attributes are present.
(Zakour, Venturini, Beatson, & Walker, 2012a)	Journal of clinical microbiology	Infection contracted by women after vaginal or abdominal delivery as evidenced by fever at one day post-partum	Present	Present	Definition does not specify the puerperium period but has antecedents and attributes
(Hussein & Walker, 2010)	The royal college of Obstetricians and gynaecologists Journal	Any bacterial infection of genital tract that occurs after the birth of a baby. It is usually more than 24 hours after delivery before symptoms and signs appear.	Present	None	The definition lacks attributes and is also limited on antecedents
(Momoh, Ezugworie, & Ezeigwe, 2010)	Advances in biological research	Infection of the genital tract following child birth.	Present	None	There are very few antecedents and there are no attributes.
(Morgan, Hughes, & Kinsella, 2012)	Royal college of obstetrics and gynaecologists Journal	Puerperal sepsis is sepsis developing after child birth until 6weeks post-natal	Present	Nil	Definition does spell out one antecedent and no attributes.
(Pradhan et al., 2015)	Nepal Journal of obstetricians and gynaecologists	Infection of the genital tract occurring at labour or within 42 days postpartum period with fever and LAP, foul smelling vaginal discharge and sub-involution of the uterus	Present	Present	Antecedents and attributes not fully defined.
(Stuart, 2015)	Mediawiki Journal	Puerperal sepsis is sepsis occurring at any point after child birth until 6weeks postnatal.	Present	None	Definition is generalised.
(Rastogi, 2016)	National Health Portal	A bacterial infection of the genital tract occurring after the birth of a baby. There is light vaginal bleeding, shock and tenderness of lower abdomen.	Present	Present	Antecedents and attributes are also partially covered
(Bonet et al., 2017)	Reproductive health journal	Fever following child birth	Present	Present	Definition zeroed on fever

## **V. METHODS**

The researcher used the (Walker & Avant, 2011) eight steps model for concept analysis was used to guide to guide this paper as explained below

- Select a concept
- Determine purpose of the analysis
- Identify use of the concept
- Identify the defining aspects , attributes that are most associated with the concept
- Describe a model case
- Describe a borderline case, related, contrary, invented and illegitimate cases
- Identify antecedents and consequences
- Define empirical referents

The following search engines Google Scholar, Pubmed and Medline search engines from 2005 to 2017 to select ten articles relevant to the concept. The criteria for articles included was based on health articles on puerperal sepsis and related studies.

## **VI. DEFINITION OF CONCEPT**

The World Health Organisation [WHO] defines puerperal sepsis as infection of the genital tract at any time between the rupture of membranes or labour and the 42<sup>nd</sup> day postpartum in which two or more of the following are present: pelvic pain, fever (that is temperature of 38.5 degrees Celsius, or higher on any given occasion), abnormal discharge (for example the presence of pus), sub-involution of the uterus (less than 2cm/day) in the first eight days. Different authors defined puerperal sepsis differently. Morgan et al (2012) defined puerperal sepsis as sepsis developing after childbirth until six weeks post-natal. (Zakour, Venturini, Beatson, & Walker, 2012b) defined it as infection contracted by women after vaginal or abdominal delivery as evidenced by fever at one day postpartum. According to Youngson, (2005) puerperal sepsis is infection in the female genital tract within ten days of childbirth, miscarriage or abortion. There is fever, lower abdominal pain and an ill-smelling vaginal discharge.

The researcher defined puerperal sepsis as infection of the female genital tract within 42<sup>nd</sup> postpartum as a complication of childbirth, abortion or miscarriage in which the signs and symptoms include two or more of the following: pyrexia of 38.5 degrees Celsius and above, increased heart rate, lower abdominal pain or pelvis, tenderness of the lower abdomen, foul smelling vaginal discharge sometimes consisting of pus, sub-involution of the uterus, pallor, impending shock, loss of appetite, headache, constant feeling of tiredness and fatigue.

## **VII. ANTECEDENTS**

According to (Walker & Avant, 2011) antecedents are incidents and circumstances which occur prior to the occurrence of the concept. Factors fuelling puerperal sepsis are as follows, childbirth, abortion or miscarriage, unhygienic delivery, home delivery, lowered immunity, assisted delivery, low socio-economic status (poverty), existing infections, anaemia.

### **7.1 Child birth, Abortion, Miscarriage**

Puerperal sepsis is infection that occurs in the genital tract. Postpartum infection often starts in the uterus post-delivery (Nicholls, 2016). It develops in the raw interior surface of the uterus after the detachment of the placenta, that is after delivery. In addition to trauma sustained during the birth process or caesarean procedure, physiologic changes during pregnancy contribute to the development of the development of postpartum infections (Wong, 2017). The extent of the affliction depends on the type of micro-organism, the resistance ability of the infected tissues (or the lack of it) and the general health of the new mother (being the parent, 2018). Mode of delivery in itself does not affect sepsis rate if optimal aseptic measures are taken.

### **7.2 Low Socio-Economic Status (Poverty)**

Puerperal sepsis is a leading cause of preventive maternal mortality in developing countries due to poverty (Khan & Hashmi, 2014). There are higher chances of puerperal sepsis in poor females, thus majority of births takes place at home where deliveries are conducted without aseptic measures (Shamshad, Shamsher, & Rauf, 2010). In a study done in Pakistan on puerperal sepsis 73.9% of the women were unable to afford health facilities. Low socio-economic status was significantly associated with lack of antenatal care.

### **7.3 Lowered Immunity**

Studies done in Uganda (Ngonzi et al, 2016) on deliveries including vaginal and caesarean section deliveries indicated that HIV infected women had over three times the risk of puerperal sepsis compared with

uninfected women. HIV infected women are biologically plausible, as the immune suppression associated with HIV increases susceptibility to infection (Calvert & Ronsmans, 2013).

#### **7.4 Unhygienic Delivery**

Clean delivery practices are known to prevent puerperal sepsis. Despite the known importance of hygiene during delivery puerperal sepsis remains a cause of concern. In Zimbabwe, even in areas with easy access to health centres, women are still being delivered by traditional midwives who most of the time do deliveries in unhygienic settings (WHO, 2004). In the case of some Apostolic sects their women don't deliver at hospitals and deliver at their shrines exposing women to infections due to unhygienic settings and no septic measures. In Pakistan traditional births attendants do not practice aseptic measures like hand washing and aseptic materials to provide clean delivery surface and perineal hygiene (Shamshad, Shamsher, & Rauf, 2010)

#### **7.5 Existing Infections**

In a study done in Egypt, untreated bacterial infection was associated with puerperal sepsis. Bacterial vaginosis has been reported to be associated with postpartum uterine infection as a result of ascending infection through the cervical canal (ALEXANDRIA, n.d.). Sexually Transmitted Infections such as Chlamydia can also play a part in causing puerperal sepsis

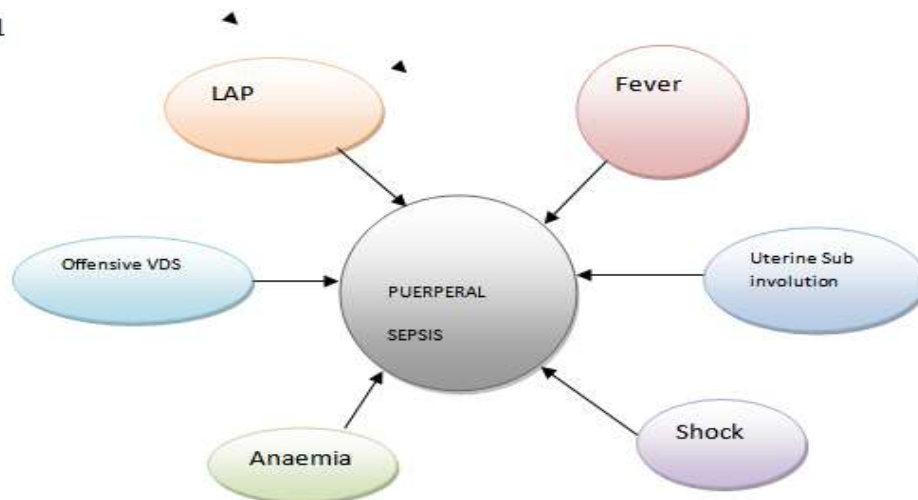
#### **7.6 Anaemia**

Anaemia affects as many as half of all pregnant women in low income and middle income countries (Daru et al., 2018) Due to poverty during antenatal women maybe hindered from acquiring adequate food. Anaemic women have low resistance to infections (Khaskheli, Baloch, & Sheeba, 2013). Anaemia causes puerperal sepsis as a result of diminishing the host resistance as well as occurrence of uterine ischaemia, which increases the susceptibility for uterine infection (ALEXANDRIA, n.d.).

### **VIII. ATTRIBUTES**

Attributes are those traits / characteristics of a concept that are closely linked with the concept and will assist in differentiating a particular concept from any other concept (Walker & Avant, 2011). The identified attributes of puerperal sepsis were, fever of 38<sup>o</sup> degrees Celsius and above, low abdominal pain or pelvis, foul smelling vaginal discharge, anaemia, uterine sub-involution and impending shock.

**Figure 1**



### **IX. PURPOSE OF THE STUDY**

The purpose of the concept paper was to have an in depth description of puerperal sepsis by assigning antecedents and attributes.

### **X. DISCUSSION**

Definitions of puerperal sepsis have been proposed but none are used universally. There is an agreement on most of the definitions that puerperal sepsis is an infection of the genital tract after child birth. (Pradhan et al, 2015) defined puerperal sepsis as infection of the genital tract occurring at birth or within 42 days postpartum with fever, and lower abdominal pain, foul smelling vaginal discharge and sub-involution of

the uterus. Most of the definitions did not mention abortion and miscarriage as a precursor of puerperal sepsis, but limited their definitions to child birth. While the definition by [WHO] captures the meaning of puerperal sepsis, it leaves out abortion and miscarriage as part of the process and has antecedent of childbirth and attributes such as fever of 38.5degrees Celsius and higher, foul smelling discharge and uterine sub-involution. The definitions also differ on the duration of the puerperium. Some definitions only covers the first ten days postpartum, for example the definition by (Youngson, 2005) mentions only the first ten days. It states that puerperal sepsis is infection in the female genital tract within ten days of childbirth, miscarriage and abortion. There is fever, lower abdominal pain and an ill-smelling vaginal discharge. The puerperium is from child birth, abortion or miscarriage to the 42<sup>nd</sup> day.

The definitions by some of the authors lacks most antecedents, for example the definition by (Momoh et al., 2010) defines puerperal sepsis as infection of the genital tract following child birth. Puerperal sepsis was measured through the antecedent of child birth and infection of the genital tract. The definition also lacks attributes. The definitions all mention mostly the antecedent of child birth and no other antecedents. Most of the authors did not fully define puerperal sepsis. (Bonet et al, 2017) defines puerperal sepsis as fever following child birth. Puerperal sepsis is measured through fever according to this author. ( Morgan,Hughes,&kinsella et al., 2012) definition has no attributes as well. Puerperal sepsis is identified through sepsis after childbirth and site of the sepsis is not specified.

(Stuart, 2015) defines puerperal sepsis as sepsis occurring at any point after childbirth until six weeks postnatal. The author mentions infection after childbirth but does not specify on the fact that the infection must affect the genital tract. The author identified puerperal sepsis through the fact that the woman would have had childbirth.

The definitions of puerperal sepsis according to the authors is identified through infection of the genital tract post childbirth.

## **XI. MODEL CASE**

According to(Walker &Avant,2011) a model case contains all critical attributes of the concept and provides an example of the concept.

Mrs January aged 15 years was admitted at Parirenyatwa Hospital as a referral from Mtoko complaining of fever for two days after having delivered a baby a week ago at home and the delivery was conducted by her mother in law. On delivery she had an extensive perineal tear which was not repaired at time of giving birth. To manage post- partum bleeding, she used pieces of cloth as sanitary pads.

Six months before delivery she had urinary tract infection and worm infection. At the local clinic, antibiotics were prescribed but could not buy them as she had no money. On examination upon admission, she looked undernourished and anaemic and on blood test her haemoglobin was 9.0. She also had signs of impending shock. Vital signs checking revealed a temperature of 39 degrees Celsius, respiratory rate of twenty-eight. On palpation, lower abdominal pain as well as pelvic pain was evaluated and the abdomen was tense with rebounding tenderness, there was sub-involution of the uterus. She presented also with abnormal foul smelling vaginal discharge. The perineal tear oozed pus. Mrs January was commenced on intravenous fluids and intravenous antibiotics following vaginal pus swab culture. She was also commenced on iron tablets and on sitz baths.

### **11.1 Analysis**

This model contains all the antecedents which are underage at time of giving birth (15years). She delivered in unhygienic environment by an unskilled attendant. According to her history she is categorised among the low socio-economic class. The anaemia could be due to malnourishment, worm infestation or she could have had post-partum haemorrhage. She is likely to have had a difficulty delivery considering the age and the unskilled attendant. All attributes like fever of 39 degrees Celsius, anaemia, undernourishment, impending shock, tachycardia, lower abdominal pain, pelvic pain, sub-involution of uterus, and abnormal foul smelling vaginal discharge.

## **XII. BORDERLINE CASE**

Borderline case is closely connected to the case, but has some dissimilarity that makes it inherently distinguishable from the concept being studied(Walker & Avant, 2011).

Mrs Tauzeni aged 25 years presents at Harare Central Hospital after having delivered at the same hospital three days ago complaining of fever for one day. She is well nourished.

She had an episiotomy performed and delivered by vacuum extraction. She is from the high density suburb of Mufakose and shares a room with another family. There is no electricity, water is scarce. She used cotton wool as sanitary towels. On examination she had a fever of 38.5 degrees Celsius and offensive vaginal

discharge. Uterus is well contracted. She has a gaping episiotomy and is infected. She was commenced on antibiotics and health education on personal hygiene was given.

### **12.1 Analysis**

The model contains some of the attributes like offensive vaginal discharge and fever of 38.5 degrees Celsius. She was delivered by skilled health personnel at a hospital. The puerperal sepsis could possibly have been from lack of aseptic technique from healthcare personnel, infected delivery instruments or poor personal hygiene.

## **XIII. CONTRARY CASE**

According to (Walker & Avant, 2011), a contrary case is a clear example of what the concept is not. Mrs Chari who stays in Bingacame to the clinic four weeks post-delivery with fever of 38 degrees Celsius. She delivered at the local clinic and had episiotomy done. Upon examination, her episiotomy had healed well. She had no offensive vaginal discharge. Uterus was well contracted and had no anaemia. There was no low abdominal pain or pelvic pain. Some of her family members had been treated for Malaria in the last few days. She had blood taken to exclude malaria and was commenced on anti-malarial drugs.

### **13.1 Analysis**

The model has one attribute. Although she delivered a baby and had a fever of 38 degrees Celsius the woman had no signs and symptoms of puerperal sepsis. Her fever is possibly due to other conditions like Malaria.

## **XIV. EMPIRICAL REFERENTS**

Empirical referents are categories of the actual phenomena that demonstrate the existence or presence of the concept in its contextual framework (Walker & Avant, 2011). A necessary antecedent of puerperal sepsis is child birth, abortion or miscarriage. Empirical referents which are fundamental to puerperal sepsis include that the woman has signs of severe pain of the lower abdomen, she could be withdrawn due to the foul smelling vaginal discharge. With puerperal sepsis there is low self-esteem, depression, distress and anxiety. There is fever and she could even be delirium and impending shock. The woman might avoid discussing about the child birth, abortion or miscarriage. She might even be anaemic.

## **XV. CONSEQUENCES**

Consequences are those events or incidents that can occur as a result of the occurrence of a concept and can often stimulate new ideas or avenues for research pertaining to certain concepts (Walker & Avant, 2011) Puerperal sepsis can cause bilateral tubal occlusion, leading to infertility. There can also be life threatening complications such as septicaemia, leading to shock, Disseminated Intravascular Coagulation and maternal death. Women with puerperal sepsis can develop pelvic inflammatory disease, chronic pelvic pain, pelvic abscess, disability and shock. There is lack of confidence in the woman and lack of self-esteem. The woman with puerperal sepsis can go through stigmatisation and shunning from the family, partner or husband.

## **XVI. RECOMMENDATIONS**

Harmonisation of definitions regarding puerperal sepsis should be considered among nurse midwives for standardisation of care.

## **XVII. CONCLUSION**

The researcher in writing this paper was to have an in depth and uniform definition of puerperal sepsis. The antecedents for puerperal sepsis are that the woman should have given birth, had an abortion or a miscarriage, unhygienic delivery, lowered immunity, assisted delivery, low socio-economic status and existing infections. The attributes are fever of 38.5 degrees Celsius and above, lower abdominal pain and pelvis, abnormal foul smelling discharge, impending shock, sub-involution of the uterus and anaemia.

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