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Why women die after reaching the hospital: a qualitative critical incident analysis of the “third delay” in post-conflict northern Uganda.

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Why women die after reaching the hospital: a qualitative critical incident analysis of the “third delay” in post-conflict northern Uganda.

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Abstract

Objective: To understand the delays in accessing emergency obstetrics and newborn care (EmONC) after reaching the health facility, and critically explore and describe the pathways that women who require EmONC go through.

Design: This was a qualitative study with two units of analysis: (1) Critical Incident Technique (CIT) (2) Key informant (KI) interviews with health workers and patients' attendants.

Setting: Thirteen Primary Health Care Centres (PHCCs), one general private-not-for-profit hospital, two Regional Referral Hospitals (RRHs), and one teaching hospital in northern Uganda.

Participants: Thirty-eight purposively selected health workers, patients, and attendants participated in KI interviews. CIT mapped pathways for maternal deaths and near-misses selected based on critical case purposive sampling.

Results: After reaching the health facility, a pregnant woman goes through a complex pathway that leads to delays to receive appropriate EmONC due to a shortage of medicines and supplies, lack of blood, gaps in staff coverage and skills, and barriers in the referral system. Shortage of medicines and supplies was central in most of the pathways characterised by three patterns: delay to treat, back-and-forth movements to buy medicines or supplies, and multiple referrals across non-functional facilities; increasing the likelihood of dying. Women who sought care from facilities with emergency medicines, functional operating theatres and staff with the practical capacity to identify and treat obstetric emergencies were likely to survive.

Conclusion: Our findings show that the pathway to appropriate EmONC is very complex and take too long even after making early contact with the health facility. The third delay, therefore, is indicative of gaps in a facility's emergency readiness. Consequently, to improve maternal and newborn outcomes interventions need to focus on addressing the third delay.

Keywords: Maternal deaths, Maternal near-misses, Third delay, EmONC, Critical Incident Technique, Northern Uganda.

Article summary

Strengths and limitations of this study:

- This qualitative study utilized an embedded case study design with two methods of data collection for diagrammatic and thematic analyses: Critical Incident Technique (CIT); and Key informant (KI) interviews.
- CIT comprehensively mapped pathways typically followed by cases of maternal deaths and near-misses in similar settings based on critical case purposive sampling.
- This mapping helped to identify key events like decisions and decision-makers, transport means, points of referrals, and timeframes of these critical cases.
- There were limitations to this study; for example, we conducted all the interviews within the health facilities which might have some influence on the responses.
- Also, in some cases, the absence of referral forms or any other documentation made us rely entirely on the information given by the attendants to construct the pathways.

Background:

Globally, about 300,000 women die due to complications related to pregnancy and childbirth every year [1]. The global Maternal Mortality Ratio (MMR) is estimated at 210/100,000 live births [2]. Comparably, the MMR reported for low resource settings such as sub-Saharan Africa is 500 per 100,000 live births while in the developed countries, the rates are 16 per 100,000 live births [3]. Almost all maternal deaths (99%) occur in low and middle-income countries (LMICs) [4]. More than half of these deaths occur in Sub-Saharan Africa (SSA), and about a third in South Asia [5, 6]. These are fragile, humanitarian, and post-conflict areas [7].

In Uganda, there has been a small decline in MMR between 2011 and 2016 from 438 to 336 [8, 9]. However, there are regional differences in the MMR. For example, the Acholi and Lago areas in the northern region have higher MMRs than other regions because they are post-conflict areas that experienced a two-decade civil war that disrupted the health system [9, 10]. The leading causes of maternal death are direct obstetric causes and include hemorrhage, infection, hypertensive disorders, uterine rupture, and abortion complications [11, 12]. Malaria and HIV/AIDS contribute significantly to the indirect causes of maternal deaths in Uganda [13]. The non-medical determinants of health like social, cultural, geographical, and economic factors all affect the timeliness of receiving emergency obstetric care in Uganda at both the community and health facility levels. These factors are the major delays that often lead to maternal deaths in Uganda despite improvement in ANC attendance and facility delivery under skilled attendance [9].

To put this into context, the “three delay” model has been widely used to understand the factors that underlie maternal deaths [14]. The first delay is a delay in deciding to seek clinical care during an obstetric emergency, the second delay is a delay in reaching the health facility, and the third delay is a delay in receiving appropriate care while at the health facility. According to this model, the delays exist across all levels of the healthcare system. However, the third delay has been under-documented and under-researched with no in-depth and critical analysis of the pathways that women with obstetric complications follow [15, 16]. Moreover, the met need for emergency obstetrics and newborn care (EmONC) in some post-conflict regions, and LMICs is still very low [17-20]. In the context of Uganda, being a low-income country and a post-conflict setting in some parts, it is possible to hypothesize that there are significant delays in receiving EmONC while at the health facilities with its potentially bad maternal and newborn outcomes. Therefore, the purpose of this

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3 study was to (1) understand the delays in accessing EmONC after reaching the health facility; (2)
4 explore and describe the pathways that women who require CEmONC go through after seeking care
5 at the BEmONC facilities.
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8 **Methods:**

9 **Study design**

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14 This qualitative study utilized an embedded case study design with two units of analysis: (1) Critical
15 Incident analysis of maternal deaths and maternal near misses, (2) Key informant (KI) interviews
16 with health workers and patients' attendants. The critical incident technique (CIT) was first
17 described by Flanagan in 1954 as a way of collecting specific and significant behavioral facts thus
18 giving a solid basis for making inferences [21]. It has been used as a qualitative methodology in
19 health systems research, that is useful for exploring barriers to quality care or to achieving
20 satisfaction with care provision [22]. It involves the analysis of specific incidents to determine what
21 actions or behaviors could '*lead to the best possible outcome of a given situation*' [23].
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28 **Study setting and population**

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31 The initial interviews and mapping of the pathways for cases of maternal death (MD) and maternal
32 near-miss (MNM) were carried out between November 2017 and December 2019 in northern
33 Uganda to explore the pathway to care for mothers accessing EmONC services through the referral
34 system to Lacor hospital. The hospital is located in Gulu district in the post-conflict Acholi area,
35 west of northern Uganda. It provides CEmONC services and also serves as a referral site for the
36 greater northern Uganda. It also has three satellite health centre (H/C) IIIs - Pabbo, Opit, and Amuru
37 that offer BEmONC services. A second survey was carried out at the end of June 2020 at Lira
38 Regional Referral Hospital (LRRH) and Lira University Teaching Hospital in the Lango area, east of
39 northern Uganda. The second survey aimed to increase the number of participants to get saturation.
40
41 The population for our embedded case studies used in the CIT included: (a) patients' relatives and
42 attendants, midwives, doctors, and ambulance drivers that participated in the management of the MD
43 and MNM; and (b) KI views of purposively selected 9 midwives, 5 doctors, 3 ambulance drivers, 17
44 attendants and relatives of the MD cases, and 15 cases of MNM.
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Sampling:

Purposive sampling was utilized to (a) select KIs with knowledge of the critical incidents. These were relatives of the patients and healthcare workers who managed the cases (b) healthcare providers and ambulance drivers involved in the referral system (c) MNM cases after recovery and just before discharge. We restricted ourselves to cases of MD and MNM as critical incidents. We used a critical case purposive sampling to identify the cases. Critical case sampling has been described as “a method where selected important or critical cases are examined based on the following: ‘If it happens there, will it happen anywhere?’ or ‘if that group is having problems, then can we be sure all the groups are having problems?’” [24].

Data collection

We conducted interviews after an initial process of informed consent which was in some cases verbal. The interviews for the critical incidents were conducted by EO and GA from November 2017 to December 2019 and were limited to cases that happened within 2 weeks to eliminate recall bias. GA and AM carried out the additional mapping of pathways for cases and KI interviews at the two tertiary hospitals in the Lango area. The interviews were scheduled at a time agreed upon with each interviewee, and all took place at the hospitals to avoid a potential loss to follow-up and recall bias. The maternal and perinatal death surveillance and response teams of the hospitals identified all the cases. Cases were MDs and MNMs that met the criteria for critical case purposive sampling and only those with complete records were presented in this study. To ensure the transferability of the findings, we considered cases that went through the referral system in more than two facilities, each with its unique delay.

Data analysis

All the interviews were audio-recorded, transcribed, and translated into English. The transcripts were read completely to identify the major themes and familiarise the researcher with the content. The pathways to care were mapped for each case from onset of labour pains or danger signs to discharge whether alive or dead, with a major focus on the time while at the health facilities. This mapping helped to identify key events like decisions and decision-makers, transport means, points of referrals, timeframes, and geographical locations of these critical cases. A critical incident report was then developed followed by mapping of the pathway for each case by GA and EO. To add on to its rigor,

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3 this pathway-analysis was also looked at by other members of the team. We completed the mapping
4 of the incident cases by hand and Excel shapes once the team members agreed on its accuracy. A
5 thematic inductive analysis was used for the KI interviews. The themes were determined by the
6 available data. We did not use an already existing coding frame.
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10 **Patient and Public Involvement:**

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13 The concept and design of this research were informed by experiences shared by patients and care-
14 takers during routine care for childbirth. We intend to share the results with the stakeholders after
15 publishing.
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18 **Ethical consideration**

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21 This study was approved by the Lacor Hospital Institutional Research Ethics Committee (LHIREC),
22 within the Mother and Child Health in Lacor and South Sudan (MoChHeLaSS) project. The
23 interviewers took into consideration the sensitive issues that surround deaths in most cultures of
24 Uganda. The purpose of this research was well explained to the family members after building
25 rapport. Whenever the interviewees showed any sign of emotional distress, the interviews would be
26 adjourned.
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32 **Results:**

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35 After analysing the pathways from the CIT and data from the KI interviews, we found that a pregnant
36 woman goes through a complex pathway that leads to delays to receive appropriate care while at the
37 health facility. Underlying these delays were a shortage of medicines and supplies, lack of blood, gaps
38 in staff coverage and skills in managing obstetric emergencies, and barriers in the referral system as
39 summarised in Fig.1. The CIT elucidated similar pathways of maternal mortality in all the selected
40 areas of northern Uganda. Shortage of medicines and supplies was central in all the pathways
41 characterised by three patterns: delay to treat, back-and-forth movements to buy medicines or supplies,
42 and referral across multiple non-functional facilities. Some women by-passed non-functional health
43 facilities or sought care from traditional birth attendants (TBAs) and religious leaders other than the
44 formal healthcare system.
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Shortage of medicines and supplies:

The public facilities get medicines and supplies from the National Medical Store (NMS). The medicines and supplies are delivered to the facilities on a fixed schedule. A midwife reported that patients sometimes buy emergency medicines like oxytocin and magnesium sulphate as they wait for the next delivery of medicines. Some KIs cited a severe shortage of supplies like gloves, fluid giving sets, urinary catheters, and intravenous cannulas as some of the reasons for the delay to receive EmONC services. As a result, a lot of time is wasted trying to raise money to buy these supplies. Even those who readily have the money often walk or get transport to distant pharmacies.

“She was in labour for two days at the health centre. When we reached the regional referral hospital, they told us to buy gloves and a tube for urine. The husband ran home to borrow money. When he came back the doctor told us that the womb had ruptured and that we use that money to go to Lacor Hospital. It’s bad, she died” (mother-in-law of an MD case)

Lack of antihypertensives and anticonvulsants was a common problem in BEmONC facilities while CEmONC facilities lack anesthetic drugs and spinal needles. For example, Fig. 5 illustrates a delay to receive emergency medications for hypertensive disorders and by-passing facilities with non-functional operating theatres.

Depending on the geographical location, the nearest health facility where a woman in the village could get EmONC is a PHCC health centre (H/C) II or III serviced by a midwife and clinical officer. However, most of the PHCCs in the upcountry regions (northern, eastern, and western) are not fully functional because of frequent stock-outs of EmONC signal function drugs. As a result, the EmONC services are mainly offered by the tertiary level facilities that include the RRHs and NRH.

“We are now receiving very many referrals from the lower H/Cs due to lack of oxytocin and intravenous fluids. It’s now two months since the drugs were delivered to those facilities, the next delivery is next month” (midwife in-charge, LRRH).

The health facilities in the urban areas are mainly privately owned and often do not experience stock-outs of medicines, but they too costly for the poor population. The slum-dwellers, who are largely poor, are served by the public RRHs. The typical pathways of MDs and MNMs that we observed for MDs from urban areas are not different from the remote areas, mainly due to lack of tracer medicines and medical supplies.

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3 “We often get stock-out of medicines, and you know, we are supplied quarterly. The population we
4 serve is much bigger than what is budgeted for because of the many slums around the town” (Ward
5 in-charge, LRRH)
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9 “It’s true, sometimes we get bad outcomes of the mother or baby because of drug stock-outs.
10 Remember these are very poor women from the slums. What would you do if a mother can not buy
11 medicines from the private pharmacies in times of stock-out and yet she is actively bleeding?”
12 (Midwife, Lira Regional Referral Hospital)
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16 **Lack of blood and functionality of the operating theatres:**

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18 According to the health system in Uganda, all the H/C IVs and hospitals are supposed to offer
19 CEmONC. This requires that they have functional operating facilities with the capacity to do
20 emergency caesarean sections and give blood transfusions. The stakeholders that we interviewed
21 reported that these facilities are not fully functional in some areas. Some health workers and attendants
22 reported blood shortage being worse during holidays since students comprise the largest number of
23 donors. Some patients and attendants reported waiting for blood or being referred to another health
24 facility during times of blood-scarcity.
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32 “We reached at 8.00 pm but had to wait for 4 hours for blood. There was only one unit from the blood
33 bank, yet they needed four units so that the operation could be done. She was bleeding too much and
34 died on the way here.” (Husband of an MD case)
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38 As illustrated in Figure 7, lack of blood was noted across all levels of facilities including Lacor hospital
39 and other regional referral hospitals.
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42 By design, all the H/C IVs have operating theatres but some are not fully functional. Lack of
43 anaesthetists, spinal anaesthesia drugs, and needles was cited as reasons for the non-functionality of the
44 operating theatres as illustrated by a case in Figure 8.
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48 “We get so many referrals from H/C IVs for emergency Caesarean section; of course with bad
49 outcomes quite often. At least for us here patients can buy some drugs from the pharmacies in case of
50 stock-outs, which is not the case in the villages where the H/C IVs are” (Midwife, Lira University
51 Teaching Hospital)
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Gaps in staff coverage

Gaps in staff coverage were referred to as a "chronic" problem across all public health facilities. For most of the lower H/Cs, the KIs reported that the only available midwife in each facility is most times away for training and workshops because of the attached monetary incentives. The mothers are sometimes attended by nursing assistants who largely lack midwifery training. Another example given was a gatekeeper who carries out deliveries in one of the BEmONC facilities whenever the midwife is away.

In most CEmONC facilities, the doctors and anesthetists are sometimes not available on weekends and public holidays. We noted during the interviews that most doctors own private facilities near their workplaces. In the afternoon hours and on weekends they retreat to their privately owned facilities. The stakeholders attributed this to lack of supervision by the facility in-charges and the district health officers (DHOs).

"There is no H/C IV that is fully functional. Well, the structures are there but the personnel are not available full time especially on weekends and at night. For example, doctors. It's not easy to find them full time at work. I was told to wait until Monday... Imagine, I would be dead now" (MNM case)

In the analysis of the pathways, skilled personnel are critical in executing timely intervention to treat or refer. Fig. 2 illustrates a delay to treat and refer. Some facilities often close their maternity units when the midwives are not available making patients seek alternative care from the TBAs and religious leaders (Figs. 3 and 4)

Skills of the staff

Skilled birth attendants are necessary for early identification and management of obstetric complications. Many patients and their attendants indicated that midwives take too long to intervene, including referral to a higher facility when needed. Some MNMs reported that they had to demand referrals, but ended up with bad outcomes.

"Last week I laboured for four days at the health facility. I told the midwife that this is not how my labor has always been [...]. She said that I was pretending and that everything was fine because

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3 *some labours take long like that. I had a sharp pain then started bleeding seriously, she then told us*
4 *to go to the main hospital. ... my womb was torn already and they removed it. I thank God that I'm*
5 *still alive.” (MNM case)*
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10 During the KI interviews, some stakeholders pointed out training gaps among doctors and midwives.
11 As a result, the health workers have knowledge gaps and often take long to intervene; causing
12 unnecessary delays.
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17 *“... the midwives and doctors of these days are ‘half baked.’ They are very slow and take long to*
18 *decide. They can't handle emergencies because you have to act fast” (Ward in-charge, Lacor*
19 *Hospital).*
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24 A critical training gap was reported in some privately-owned midwifery schools that lack teaching
25 hospitals. A midwife supervisor also cited a lack of internship for certificate and diploma midwives.
26 Figure 6 illustrates a possible gap in skills where a midwife kept a mother in active labour for three
27 days.
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32 **Delays in the referral system**

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35 There were reports of inter-facility delays due to the unfavourable state of the roads. According to the
36 ambulance drivers, most roads that link the BEmONC facilities to CEmONC facilities are almost impassible,
37 especially during rainy seasons. The roads usually flood when it rains heavily. This leads to a delay during the
38 referral process.
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42 *“I've not gone to many places to see how bad the roads are. But when it rains, the roads are*
43 *impassable. We usually delay so much on the road and if it is a bad emergency, the mother can even*
44 *lose the baby” (Ambulance driver, Lacor Hospital)*
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49 Many midwives were also concerned about delays to access ambulances. They attributed this to the
50 centralised ambulance system. For the case of Lacor hospital and its satellite H/Cs, the ambulance
51 system is designed in such a way that they are stationed at the main hospital. In case of any
52 emergency at the lower H/Cs, the ambulance is called from the main hospital, which is on average
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3 70 km away. There is usually some delay owing to the bad roads in the remote areas where these
4 H/Cs are located.
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8 *“For quality and quick response, we are not yet a hundred percent, because you can imagine a*
9 *mother with cord prolapse is in Amuru, 75 kilometers away, then they discover, they have to call*
10 *here [Lacor Hospital]. So, there are delays sometimes. Some emergencies don’t need any delay at*
11 *all.” (Midwife, Lacor Hospital)*
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17 The system for government facilities is not any different. The ambulances are stationed at the
18 regional referral and district hospitals, but they have inadequate fuel most times.
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22 *“For us, we have to call the district hospital for the ambulance. But you have to wait until the*
23 *attendants get money for fuel” (Midwife from H/C III, who escorted a referred mother)*
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27 It was reported that some patients are so poor and can spend the whole day trying to raise money for
28 fuel. In some cases, they have to first go back home and sell land or animals.
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31 In one of the pathways, we also noted a back and forth referral pattern. As illustrated in Figure 9,
32 each facility refers to the other in a zigzagging manner after failing to carry out a diagnostic test or
33 an operation.
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37 **Discussion:**

38 Although maternal deaths and near-misses have been largely studied with a major focus on
39 biological causes of death, this study elucidated some intriguing reasons why mothers die even after
40 making early contact with formal healthcare. Our findings show that the pathways to getting
41 appropriate care are very complex and take too long. In the pathways that we analysed, all the
42 women took much longer while at the health facilities than the common threshold and got
43 complications. This is consistent with the definition of the duration of the third delay by Edson et al
44 [25]. The pathways to maternal mortality are highly influenced by a shortage of medicines and
45 supplies necessary for signal functions of EmONC. Typically, patients and attendants are “shuffled
46 around” to buy medicines and supplies; causing significant delays. As highlighted in some studies in
47 the LMICs, we found that most women and their attendants spend time looking for money or where
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3 to buy emergency drugs like magnesium sulphate and oxytocin, and parenteral antibiotics [26, 27].
4 Because most lower facilities lack medicines and supplies, some women had to trek across districts
5 to access BEmONC services. This is contrary to the WHO recommendation of accessibility within 5
6 kilometres [28].
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10 As illustrated in the various pathways in this study, women who require CEmONC services often
11 face significant challenges. Similar to most LMICs, lack of blood and blood products, gaps in
12 coverage by doctors and anaesthetists, and power outages were major hindrances to accessing
13 emergency operations [29, 30]. Even in cases where emergency caesarean sections were done, it
14 took longer than the thirty-minute to the one-hour interval of decision to knife-on-skin as stipulated
15 in some guidelines [31, 32].
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21 The pathways described in this study also show that women experience significant “passive delays”
22 due to limited practical capacity to identify and treat obstetric emergencies even in facilities with a
23 fair stock of EmONC tracer drugs. Similarly, a study done in Kenya found that availability of signal
24 functions alone does not directly translate into a readiness to manage obstetric emergencies, but
25 rather a clinical cascade that involves the ability to identify the emergency, treat it, and monitor-
26 modify therapy [33]. Women who were first assessed by personnel with suboptimal midwifery skills
27 like general nurses, nursing assistants, and TBAs were likely to die in most of the pathways. Some
28 studies have found that these women receive wrong medicines, are not monitored, and often referred
29 late [34, 35].
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38 Evidence from LMICs shows that most BEmONC facilities refer between 60-80% of their patients
39 to CEmONC facilities [36-38]. A good referral system is therefore very important for good maternal
40 and neonatal outcomes [39, 40]. From this study, we found delays and disrespectful care in the inter-
41 facility referral system for mothers who needed CEmONC services. The pathways elucidated four
42 patterns of delays in the inter-facility referrals: (1) Delay in deciding to refer (2) Referral through
43 multiple non-functioning CEmONC facilities, (3) Back-and-forth referrals, and (4) By-passing a
44 non-functional CEmONC facility. These potentially precarious referral patterns were due to gaps in
45 coverage by a doctor or experienced midwife especially on weekends and public holidays, non-
46 functional operating theatres, or lack of essential diagnostics like ultrasonography. The major point
47 of delay in the referral system was the first point of care and often related to the capacity to identify
48 complications promptly as highlighted in some studies [41, 42].
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Study limitations:

This study had some limitations that warrant cautious generalisation of the findings. We carried out all the interviews at the health facilities and this may pose response bias. However, we compared responses from respondents along similar pathways to eliminate gross response bias. Secondly, the cases were from health facilities with regional variations that might have influenced the findings. We countered this by using critical case purposive sampling; the findings may not vary so much. Thirdly, in some cases, no reliable documentation made us rely entirely on the information given by the attendants to construct the pathways. This might have some errors in estimating the time intervals and critical decisions. Overall, the concept and understanding used in this study are transferable.

Conclusion:

From this study, it is clear that a pregnant woman goes through a complex and precarious pathway to receive EmONC services even after reaching the health facility. This study elucidated three pathways to maternal death as a result of the third delay: delay to treat, back-and-forth referrals to buy medicines, and multiple referrals across non-functional health facilities mainly due to the shortage of medicines and medical supplies, gaps in staff coverage and skills, and delays in the inter-facility referral. These pathways provide a novel framework to assess, track, and improve the health facility's practical readiness to identify and treat obstetric emergencies. The pathways also provide a qualitative, critical approach to clearly describe the third delay. Therefore, to improve maternal and newborn outcomes interventions need to focus on addressing the third delay focusing on gaps along the pathways.

Availability of data and materials:

The materials presented here can be got from the corresponding author upon reasonable request.

Conflict of interest:

The authors declare no conflict of interest.

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Author contributions:

GA, AM, and EO conceived the idea and wrote the design. VN and GA collected data. GA and EO carried out data analysis and writing the manuscript. PB and JB did the overall review and editing.

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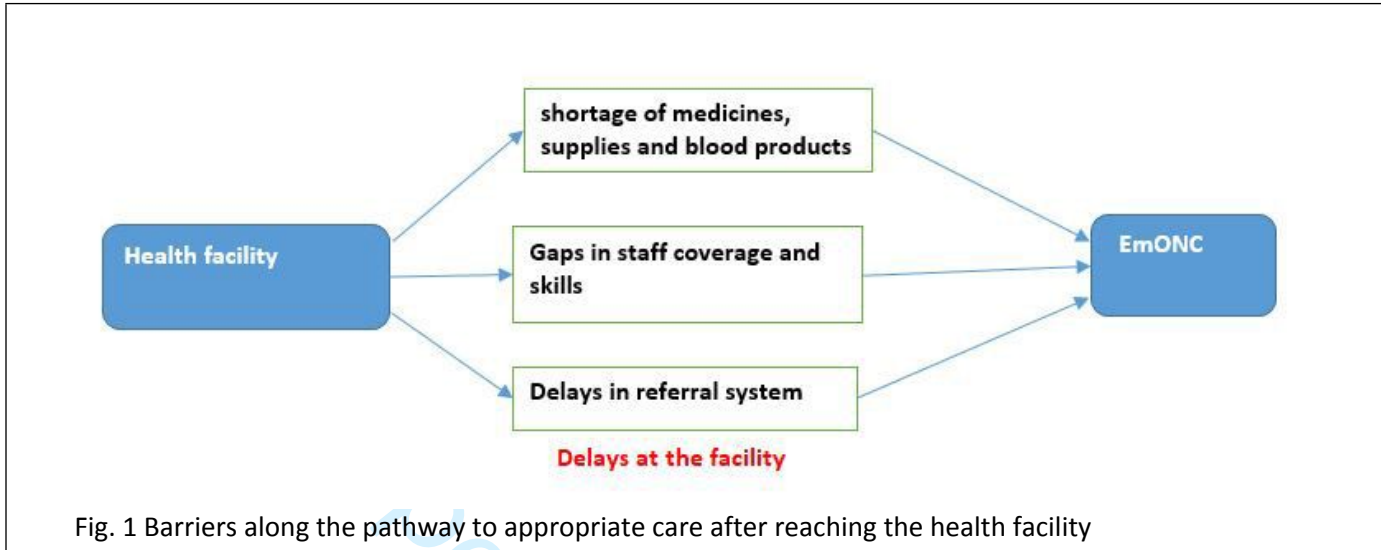
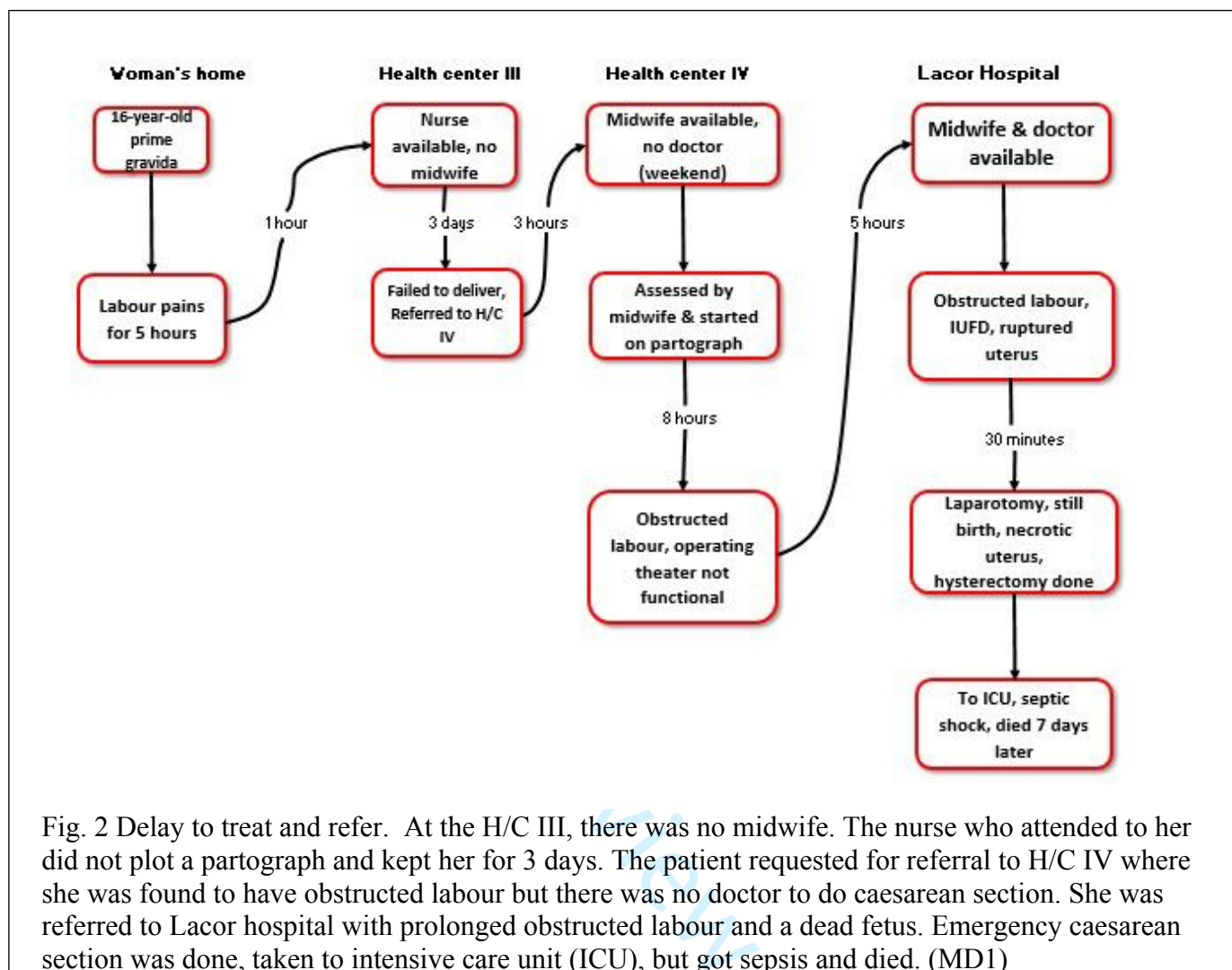


Fig. 1 Barriers along the pathway to appropriate care after reaching the health facility

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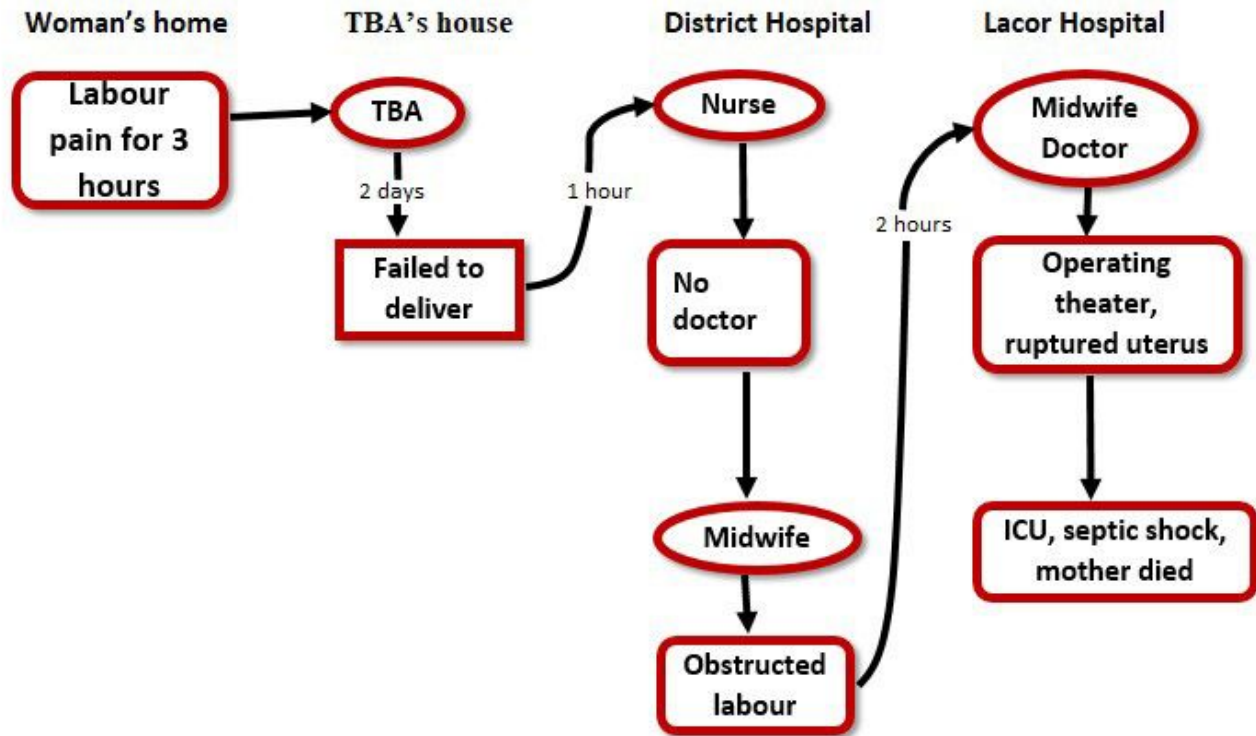


Fig. 3 Delay to treat due to non-functional facility and seeking care from the TBA. She had labour pain for 3 hours then went to the TBA because the nearby H/C III had no midwife. The TBA kept her for two days until she failed to deliver. She was referred to the district hospital but the doctor was not available over the weekend prompting referral to Lacor hospital. She had a ruptured uterus and died of septic shock 4 days after operation. (MD2)

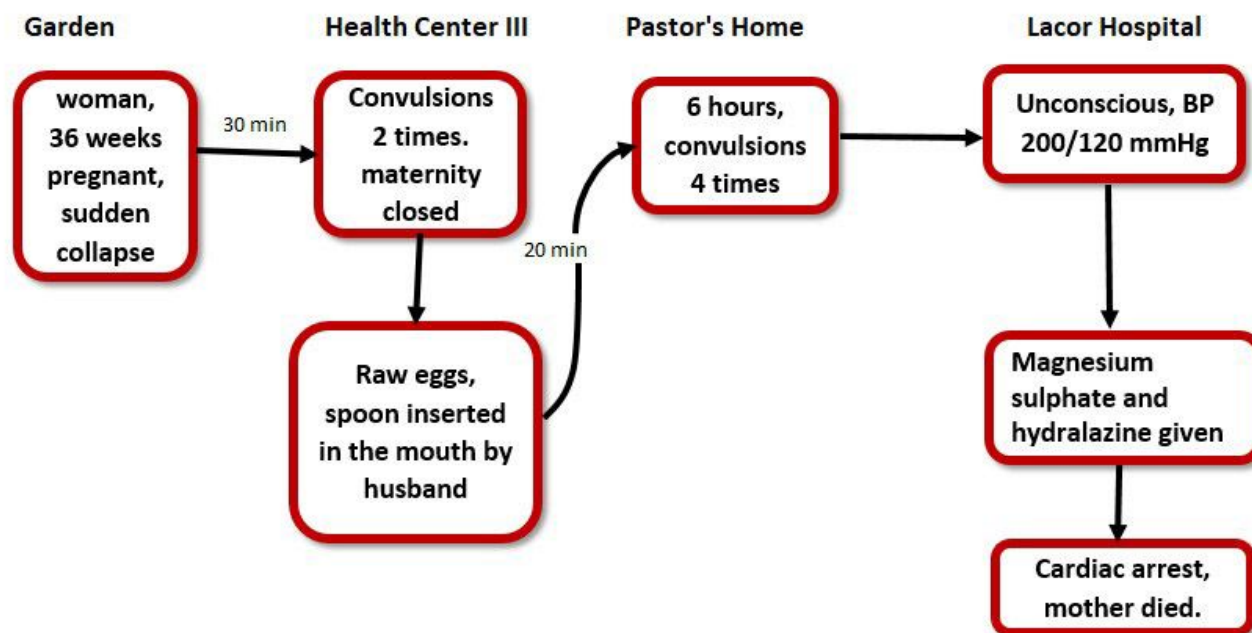
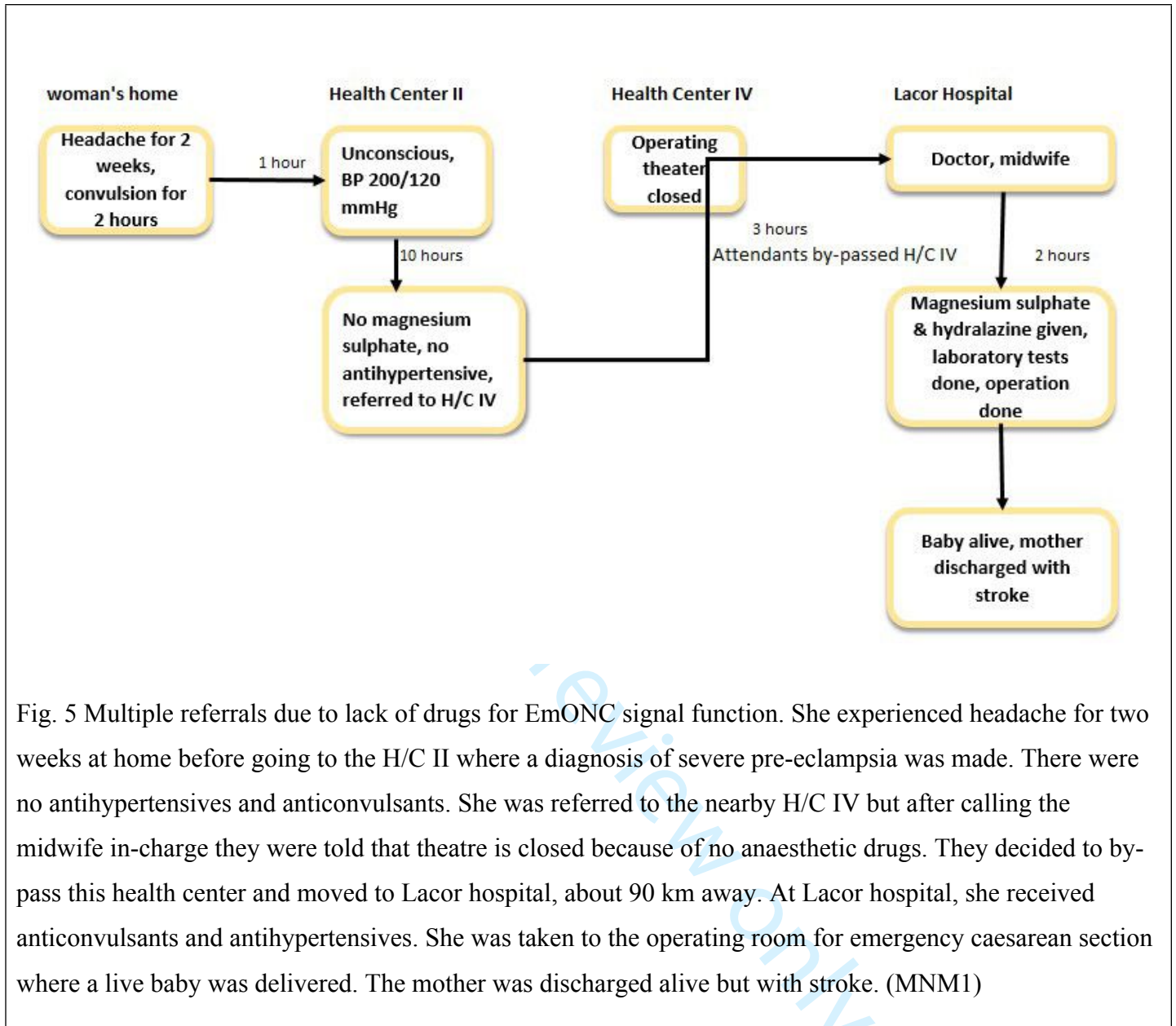


Fig. 4 Non-functional BEmONC facility and seeking care from the religious leader. The woman suddenly collapsed from the garden. She was taken to the H/C III and found the maternity unit closed because there was no midwife. After two episodes of convulsions, the husband gave her raw eggs and inserted a spoon in the mouth to stop her from biting the tongue. The mother-in-law advised that the woman be taken for prayers since the condition might be linked to evil spirits. She spent six hours with the pastor but continued to fit. When she deteriorated, the husband rushed her to Lacor hospital where the blood pressure was found to be very high. She was given treatment but died after 30 minutes due to eclampsia. A peri-mortem operation was done and extracted a live baby. (MD3)



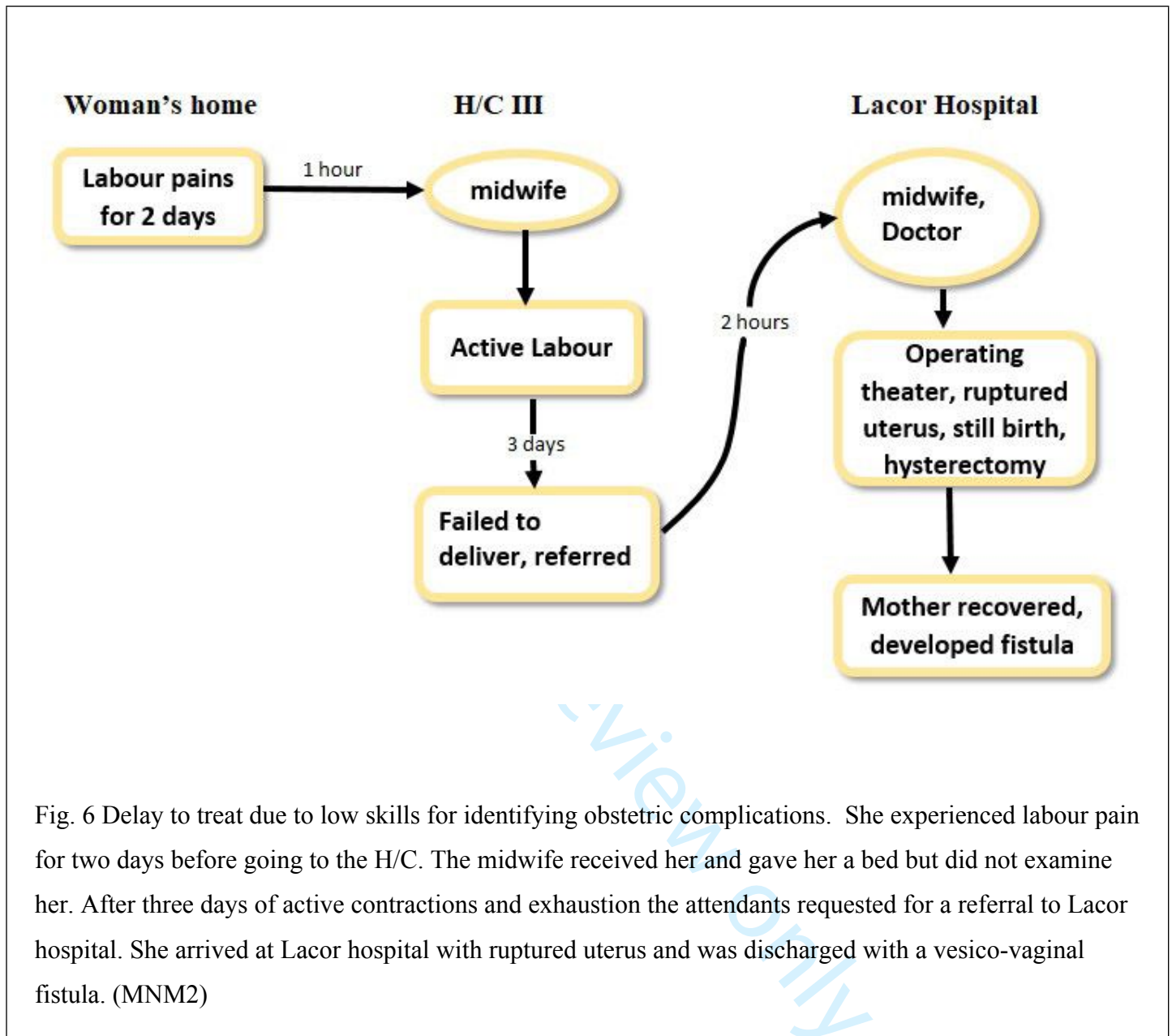


Fig. 6 Delay to treat due to low skills for identifying obstetric complications. She experienced labour pain for two days before going to the H/C. The midwife received her and gave her a bed but did not examine her. After three days of active contractions and exhaustion the attendants requested for a referral to Lacor hospital. She arrived at Lacor hospital with ruptured uterus and was discharged with a vesico-vaginal fistula. (MNM2)

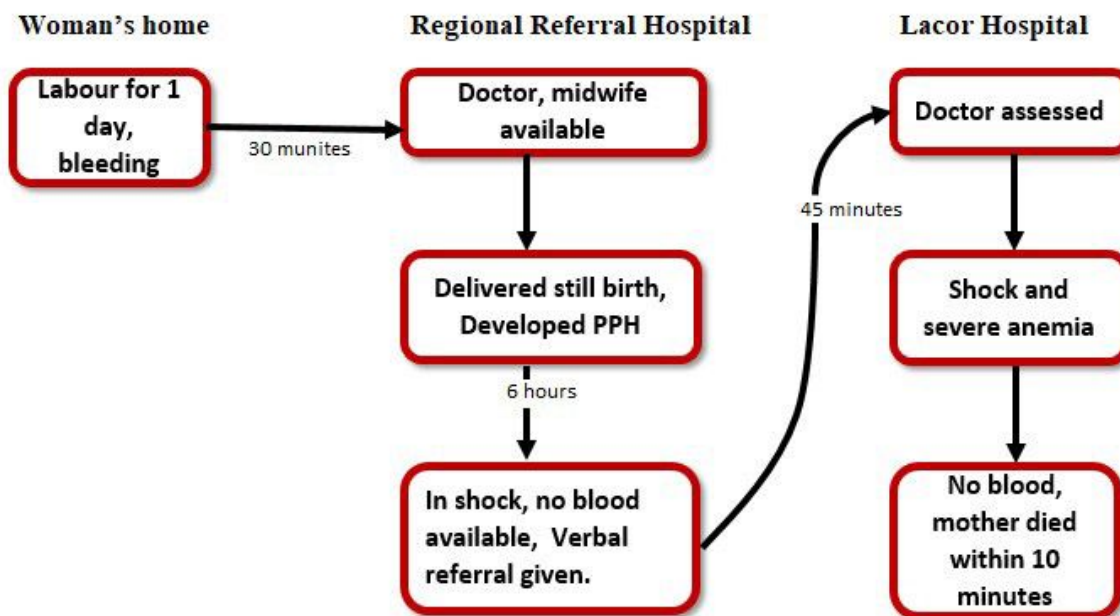


Fig. 7 Lack of blood. She experienced labour pains for one day and bleeding for 4 hours before going to the RRH. She had a fresh still birth and developed post-partum hemorrhage. The doctor requested for three units of blood but there was no blood. She was referred to Lacor Hospital with severe anemia. At Lacor Hospital there was no blood as well; and she died at the admission point. (MD3)

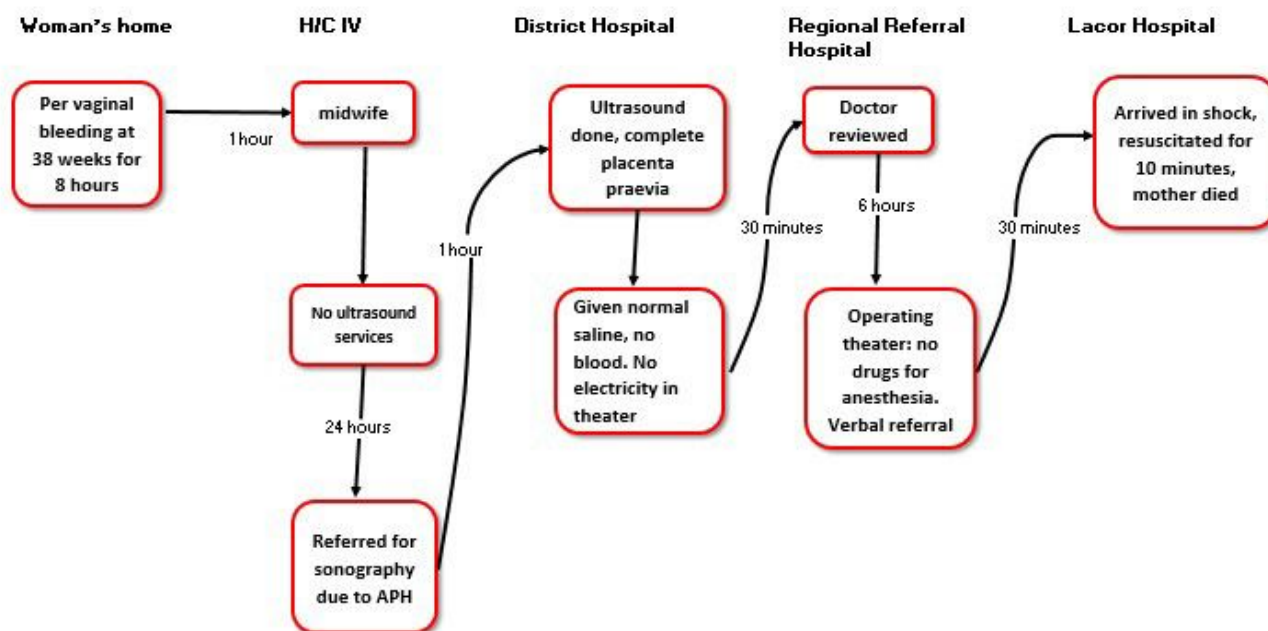


Fig. 8 Multiple referrals across non-functional CEmONC facilities. She had antepartum hemorrhage (APH) and went to a health center IV but the midwife referred her to the District Hospital for ultrasound scan; and it confirmed complete placenta praevia. A decision to do emergency caesarean section was made but the operating did not have electricity prompting referral to the RRH. At the RRH she spent six hours looking for money to buy drugs for anesthesia. After failing to get the money, she was verbally referred to Lacor Hospital but had bled a lot and died of hemorrhagic shock. (MD5)

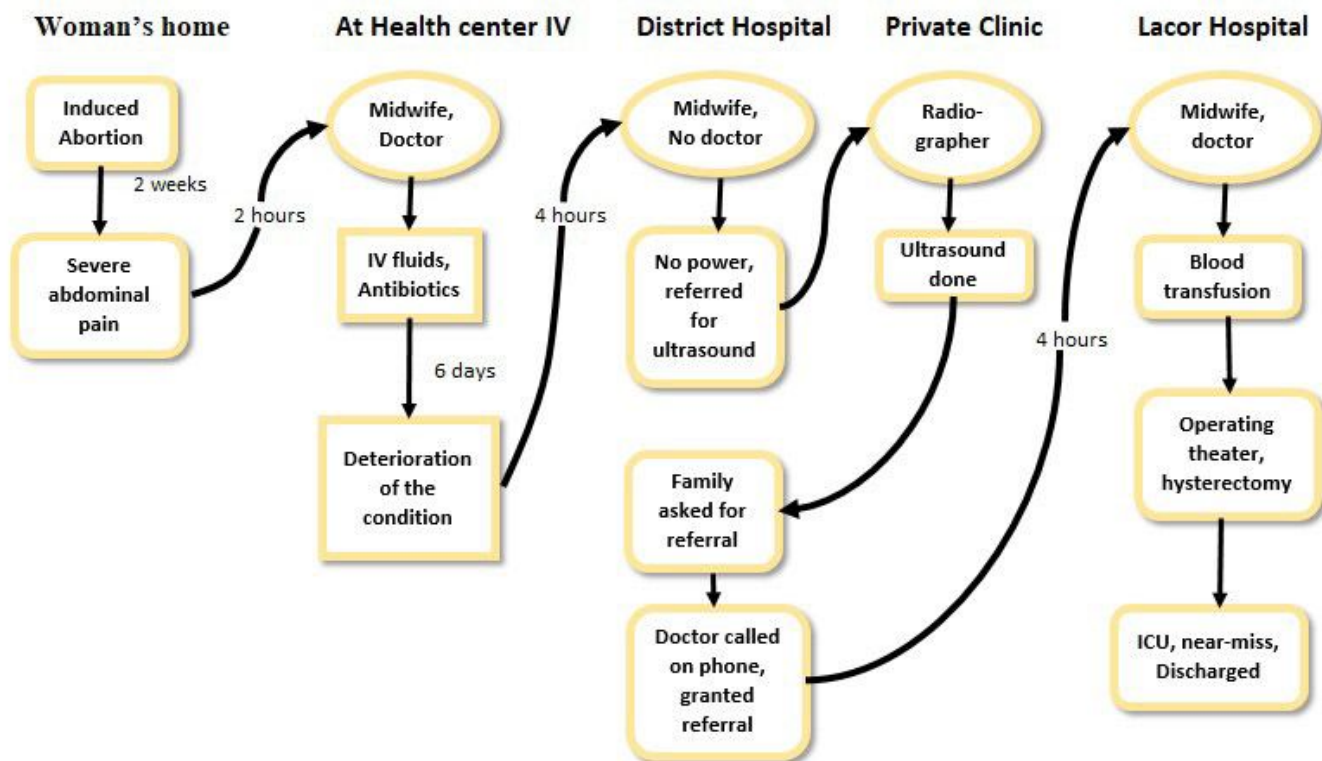


Fig. 9 Back-and-forth referral due to lack of diagnostics. She had unsafe abortion then went to the H/C IV. The doctor reviewed and started her on antibiotics and intravenous fluids. She was referred to the district hospital for abdominal ultrasound scan and complete blood count. Unfortunately, these investigations could not be done. She was again referred to a private medical centre for ultrasound scan that showed massive pyoperitoneum. Operation could not be done because there was no electricity. The family requested for referral to Lacor hospital where operation was done; uterus removed and discharged alive after 5 days. (MNM3)

Reporting checklist for qualitative study.

Based on the SRQR guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the SRQR reporting guidelines, and cite them as:

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med.* 2014;89(9):1245-1251.

	Reporting Item	Page Number
Title		
	#1 Concise description of the nature and topic of the study identifying the study as qualitative or indicating the approach (e.g. ethnography, grounded theory) or data collection methods (e.g. interview, focus group) is recommended	1
Abstract		
	#2 Summary of the key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results and conclusions	2
Introduction		
Problem formulation	#3 Description and significance of the problem / phenomenon studied: review of relevant theory and empirical work; problem statement	4
Purpose or research question	#4 Purpose of the study and specific objectives or questions	5

1 **Methods**

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3	Qualitative approach and	#5	Qualitative approach (e.g. ethnography, grounded theory, case
4	research paradigm		study, phenomenology, narrative research) and guiding theory if
5			appropriate; identifying the research paradigm (e.g.
6			postpositivist, constructivist / interpretivist) is also
7			recommended; rationale. The rationale should briefly discuss
8			the justification for choosing that theory, approach, method or
9			technique rather than other options available; the assumptions
10			and limitations implicit in those choices and how those choices
11			influence study conclusions and transferability. As appropriate
12			the rationale for several items might be discussed together.
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19	Researcher characteristics	#6	Researchers' characteristics that may influence the research,
20	and reflexivity		including personal attributes, qualifications / experience,
21			relationship with participants, assumptions and / or
22			presuppositions; potential or actual interaction between
23			researchers' characteristics and the research questions, approach,
24			methods, results and / or transferability
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29	Context	#7	Setting / site and salient contextual factors; rationale
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31	Sampling strategy	#8	How and why research participants, documents, or events were
32			selected; criteria for deciding when no further sampling was
33			necessary (e.g. sampling saturation); rationale
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36	Ethical issues pertaining to	#9	Documentation of approval by an appropriate ethics review
37	human subjects		board and participant consent, or explanation for lack thereof;
38			other confidentiality and data security issues
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42	Data collection methods	#10	Types of data collected; details of data collection procedures
43			including (as appropriate) start and stop dates of data collection
44			and analysis, iterative process, triangulation of sources /
45			methods, and modification of procedures in response to
46			evolving study findings; rationale
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50	Data collection instruments	#11	Description of instruments (e.g. interview guides,
51	and technologies		questionnaires) and devices (e.g. audio recorders) used for data
52			collection; if / how the instruments(s) changed over the course
53			of the study
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57	Units of study	#12	Number and relevant characteristics of participants, documents,
58			or events included in the study; level of participation (could be
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reported in results)

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3	Data processing	#13	6
4		Methods for processing data prior to and during analysis,	
5		including transcription, data entry, data management and	
6		security, verification of data integrity, data coding, and	
7		anonymisation / deidentification of excerpts	
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9	Data analysis	#14	6
10		Process by which inferences, themes, etc. were identified and	
11		developed, including the researchers involved in data analysis;	
12		usually references a specific paradigm or approach; rationale	
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14	Techniques to enhance	#15	6
15	trustworthiness	Techniques to enhance trustworthiness and credibility of data	
16		analysis (e.g. member checking, audit trail, triangulation);	
17		rationale	
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20	Results/findings		
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22	Syntheses and	#16	7-8
23	interpretation	Main findings (e.g. interpretations, inferences, and themes);	
24		might include development of a theory or model, or integration	
25		with prior research or theory	
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27	Links to empirical data	#17	8-12
28		Evidence (e.g. quotes, field notes, text excerpts, photographs) to	
29		substantiate analytic findings	
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31	Discussion		
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34	Intergration with prior	#18	12-13
35	work, implications,	Short summary of main findings; explanation of how findings	
36	transferability and	and conclusions connect to, support, elaborate on, or challenge	
37	contribution(s) to the field	conclusions of earlier scholarship; discussion of scope of	
38		application / generalizability; identification of unique	
39		contributions(s) to scholarship in a discipline or field	
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42	Limitations	#19	13
43		Trustworthiness and limitations of findings	
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45	Other		
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47	Conflicts of interest	#20	14
48		Potential sources of influence of perceived influence on study	
49		conduct and conclusions; how these were managed	
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51	Funding	#21	14
52		Sources of funding and other support; role of funders in data	
53		collection, interpretation and reporting	

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BMJ Open

Why women die after reaching the hospital: a qualitative critical incident analysis of the “third delay” in post-conflict northern Uganda.

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Primary Subject Heading:	Obstetrics and gynaecology
Secondary Subject Heading:	Public health, Obstetrics and gynaecology, Qualitative research
Keywords:	GYNAECOLOGY, Maternal medicine < OBSTETRICS, PUBLIC HEALTH

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Why women die after reaching the hospital: a qualitative critical incident analysis of the "third delay" in post-conflict northern Uganda.

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Abstract

Objective: To understand the delays in accessing emergency obstetrics and newborn care (EmONC) after reaching the health facility, and critically explore and describe the pathways that women who require EmONC go through.

Design: This was a qualitative study with two units of analysis: (1) Critical Incident Technique (CIT) (2) Key informant (KI) interviews with health workers, patients, and attendants.

Setting: Thirteen Primary Health Care Centres (PHCCs), one general private-not-for-profit hospital, one Regional Referral Hospital (RRH), and one teaching hospital in northern Uganda.

Participants: Forty-nine purposively selected health workers, patients, and attendants participated in KI interviews (KII). CIT mapped pathways for maternal deaths and near-misses selected based on critical case purposive sampling.

Results: After reaching the health facility, a pregnant woman goes through a complex pathway that leads to delays to receive EmONC. Five reasons were identified for the delays: a shortage of medicines and supplies, lack of blood and functionality of the operating theatres, gaps in staff coverage, gaps in staff skills, and delays in the inter-facility referral system. Shortage of medicines and supplies was central in most of the pathways characterised by three patterns: delay to treat, back-and-forth movements to buy medicines or supplies, and multiple referrals across facilities. Some women also by-passed facilities they deemed to be non-functional.

Conclusion: Our findings show that the pathway to EmONC is very precarious and take too long even after making early contact with the health facility. The need to skill and manage better the meagre human resource, and to avail essential medical supplies in health facilities may help to reduce the gaps in a facility's emergency readiness and thus improve maternal and neonatal outcomes.

Keywords: Maternal Death, Maternal Near Miss, Third Delay, EmONC, Critical Incident Technique, Northern Uganda.

Word count: 3987

Article summary

Strengths and limitations of this study:

- This qualitative study utilized two methods of data collection for diagrammatic and thematic analyses, CIT and KII, that are complementary and yield richer data for realist enquiry.
- CIT comprehensively mapped pathways typically followed by cases of maternal deaths and maternal near-misses in similar settings based on critical case purposive sampling.
- There were limitations to this study; for example, we conducted all the interviews within the health facilities which might have some influence on the responses.
- Part of this study focused on the referral system, the addition of two tertiary facilities in Lira without additional step-down health centres might be a limitation to saturation of data and might not fully present the PHCC experience.
- Critical case sampling could be biased by the researchers' selection interests. However, the researchers used independent maternal and perinatal death surveillance and response (MPDSR) teams at the tertiary hospitals to identify the cases based on the principles of analytical generalisation.

Background:

Globally, maternal mortality is still unacceptably high with about 295,000 women dying every year by 2017 [1]. More than half of the global maternal mortality occurs in Sub-Saharan Africa, and about a third in South Asia [1, 2]. These are fragile, humanitarian, and post-conflict areas [3].

In Uganda, there has been a small decline in MMR between 2011 and 2016 from 438 to 336, but with regional differences due to variations in social determinants of health [4, 5]. For example, northern Uganda is a post-conflict area and host to refugees from South Sudan; these have largely caused food insecurity and constrained resources for health with possible suboptimal maternal healthcare in the region [6, 7]. The leading causes of maternal death are direct obstetric causes and include hemorrhage, infection, hypertensive disorders, uterine rupture, and abortion complications [8, 9]. Malaria and HIV/AIDS contribute significantly to the indirect causes of maternal deaths in Uganda [10].

Several delays also exist along the pathway to care. To put this into context, the “three delay” model has been widely used to understand the factors that underlie maternal deaths [11]. The first delay is a delay in deciding to seek clinical care during an obstetric emergency, the second delay is a delay in reaching the health facility, and the third delay is a delay in receiving appropriate care while at the health facility. With exception of the first and second delays, the third delay has been generally under-documented and under-researched with only a few in-depth and critical analyses of the pathways that women with obstetric complications follow [12, 13]. Moreover, the met need for emergency obstetrics and newborn care (EmONC) in some post-conflict regions, and the Low and Middle Income Countries (LMICs) is still very low [14-17]. In the context of Uganda, being a low-income country, post-conflict and refugee-host setting in some parts, it is possible to hypothesize that there are significant delays in receiving EmONC while at the health facilities with its potentially bad maternal and newborn outcomes. Therefore, the purpose of this study was to (1) understand the delays in accessing EmONC after reaching the health facility; (2) explore and describe the pathways that women who require EmONC go through after deciding to seek care.

Methods:

Study design

This qualitative study utilized an embedded study design with two units of analysis: (1) Critical Incident analysis of maternal deaths (MD) and maternal near misses (MNM), (2) KII with persons who were perceived to know about the maternal health care by their roles as health workers or experience with the health system. The critical incident technique (CIT) was first described by Flanagan in 1954 as a way of collecting specific and significant behavioural facts thus giving a solid basis for making inferences [18]. It has been used as a qualitative methodology in health systems research, that is useful for exploring barriers to quality care or to achieving satisfaction with care provision [19]. It involves the analysis of specific incidents to determine what actions or behaviors could '*lead to the best possible outcome of a given situation*' [20]. The use of CIT complements KII by drawing on more specific experiences thereby eliciting richer data for realist enquiry [21].

Study setting and population

The first part of this study was carried out in northern Uganda to explore the pathway to care for mothers accessing EmONC services through the referral system to Lacor hospital. The hospital is located in Gulu district in the post-conflict Acholi sub-region, west of northern Uganda. It provides comprehensive EmONC (CEmONC) services and also serves as a referral site for the greater northern Uganda. It has three satellite health centre (H/C) IIIs within an average distance of 60 kilometers - Pabbo, Opit, and Amuru that offer basic EmONC (BEmONC) services. The main means of transport is the motorcycle because of poor road networks. A second part of the study was carried out at Lira Regional Referral Hospital and Lira University Teaching Hospital in the Lango sub-region, east of northern Uganda. The addition of these two tertiary facilities aimed to increase the number of participants to get saturation. Northern Uganda has an estimated population of 7.1 million, and a total fertility rate of 5.4 children per woman [5]. The population used in the CIT and KI included: patients' relatives and attendants, facility-based KIs, and the patients themselves for MNM.

Sampling and participants

Key-informants

We used a purposive sampling technique to identify and recruit the first few KIs who were healthcare workers as well as unit in-charges and attendants with knowledge of the critical incidents or members of the maternal and perinatal death surveillance and response (MPDSR) teams at Lacor hospital, Lira Regional Referral Hospital, and Lira University Teaching Hospital. This was followed by a snowball technique to identify further KIs like ambulance drivers, midwives, patients, and relatives who also participated in the care of the critical incidents. During data collection, we also identified other KIs in the above categories who accepted to participate in this study. A total of forty-nine KIs took part in this study (Table 1).

Critical incidents

We used a critical case purposive sampling to identify the cases. We restricted ourselves to MD and MNM as critical incidents. Critical case sampling has been described as “a method where selected important or critical cases are examined based on the following: ‘If it happens there, will it happen anywhere?’ or ‘if that group is having problems, then can we be sure all the groups are having problems?’” [22]. The MPDSR teams of the hospitals identified a total of fifty cases that had complete records and met the criteria for critical case purposive sampling. To ensure the transferability of the findings, we only included eight MDs and fifteen MNMs that went through the referral system in more than two facilities, except for the Lango sub-region.

Table 1 Key-informants interviewed

Category	Acholi sub-region	Lango sub-region	Total
Doctors	3	2	5
Midwives	6	3	9
Ambulance drivers	2	1	3
Patients	9	6	15
Attendants	11	6	17

Data collection

We conducted interviews after an initial process of informed consent from all the participants which was in some cases verbal because the study presented no more than minimal risk or harm. The interviews and mapping of the pathways were conducted from November 2017 to December 2019 in the Acholi sub-region. Additional mapping of pathways for cases and interviews at the two tertiary hospitals in the Lango sub-region were done in June 2020. The interviews were scheduled at a time agreed upon with each interviewee, and all took place at the hospitals and within two weeks of the occurrence of the MD and MNM to avoid a potential loss to follow-up and recall bias. For the CIT, each interview began with self-introduction since some participants were not known to the interviewers followed by the collection of the demographic and family background information. In all the cases, semi-structured interviews were carried out in Luo for the patients and their relatives or attendants and in English for the health workers. For each case, we conducted group or individual interviews, as chosen by the participants. The former case involved one respondent narrating the entire events surrounding a critical incident, followed by a further inquiry or additional contribution from the members. The four guiding questions were: ‘when did she start having labour pain or feeling unwell?’ ‘where did she go to?’ ‘how did she reach there and how long did she take?’ ‘what happened on arrival at the facility?’ However, the interviewers allowed participants to express themselves freely, audio-recorded or took systematic notes, and where possible, sketched a diagrammatic pathway for each case. Additional questions were also asked regarding ANC attendance, risk factors. For the facility in-charges, we asked questions related to quality and accessibility to EmONC services in northern Uganda. Before concluding each interview, the interviewers revisited the diagrammatic pathways to make clarifications and member checking where necessary. All the interviews were concluded by asking the interviewees for recommendations to improve EmONC services with a focus on reducing the third delay then thanking the participants.

Data analysis

All the interviews were transcribed and translated into English. The transcripts were read through several times to identify the major themes and become familiar with the content. The pathways to care were mapped for each case from onset of labour pains or danger signs to discharge whether alive or dead, with a major focus on the time while at the health facilities. This mapping helped to identify key events like decisions and decision-makers, transport means, points of referrals,

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3 timeframes, and geographical locations of these critical cases. A critical incident report that merged
4 data from CIT and KII was then developed, followed by mapping of the pathway for each case. To
5 add on to its rigor, this pathway-analysis was also looked at by other members of the team. We
6 completed the mapping of the incidents by hand and Excel shapes once the team members agreed on
7 its accuracy. A thematic inductive analysis was used for the KII. We followed the six steps of
8 thematic analysis: familiarisation, coding, generating themes, reviewing themes, defining and
9 naming themes, then writing up [23]. NVivo 10 software was used to manage the data.

16 **Patient and Public Involvement:**

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18 The concept and design of this research were informed by experiences shared by patients and care-
19 takers during routine care for childbirth. We have shared the results, especially critical incidents,
20 with the district and national stakeholders.

24 **Ethical consideration**

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26 This study was approved by the Lacor Hospital Institutional Research Ethics Committee and the
27 Uganda National Council for Science and Technology, within the Mother and Child Health Lacor
28 and South Sudan (MoCHeLaSS) project. The interviewers took into consideration the sensitive
29 issues that surround deaths in most cultures of northern Uganda. Whenever the interviewees showed
30 any sign of emotional distress, the interviews would be adjourned.

36 **Results:**

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38 After analysing the pathways from the CIT and data from the KII, we found that a pregnant woman
39 goes through a complex pathway that leads to delays to receive care while at the health facility
40 sometimes with sub-optimal outcomes. Underlying these delays were a shortage of medicines and
41 supplies, lack of blood, gaps in staff coverage and skills in managing obstetric emergencies, and
42 barriers in the referral system as summarised in Figure 1. The CIT elucidated similar pathways of
43 maternal mortality in all the selected cases: delay to treat, back-and-forth movements to buy medicines
44 or supplies, and referral across multiple facilities that were deemed non-functional. Some women
45 bypassed facilities they perceived to be non-functional or sought care from traditional birth attendants
46 (TBAs) and religious leaders.

Shortage of medicines and supplies

A midwife reported that patients sometimes buy emergency medicines like oxytocin and magnesium sulphate as they wait for the next delivery of medicines and supplies from the national medical store. Some KIs cited a severe shortage of supplies like gloves, fluid giving sets, urinary catheters, and intravenous cannulas as some of the reasons for the delay to receive EmONC services. As a result, a lot of time is wasted trying to raise money to buy these supplies.

“She was in labour for two days at the health centre. When we reached the regional referral hospital, they told us to buy gloves and a tube for urine. The husband ran home to borrow money. When he came back the doctor told us that the womb had ruptured and that we use that money to go to Lacor Hospital. It's bad, she died” (mother-in-law of an MD case, Lacor Hospital)

Lack of antihypertensives and anticonvulsants was a common problem in BEmONC facilities while CEmONC facilities lack anesthetic drugs and spinal needles. For example, Figure 2 illustrates a delay to receive emergency medications for hypertensive disorders and by-passing facilities with non-functional operating theatres.

Depending on the geographical location, the nearest health facility where a woman in the village could get EmONC is a PHCC health centre (H/C) II or III serviced by a midwife and clinical officer. However, most of the PHCCs in the region are not fully functional because of frequent stock-outs of EmONC signal function drugs. As a result, the EmONC services are mainly offered by the tertiary level facilities that include the RRHs and NRH.

“We are now receiving very many referrals from the lower H/Cs due to lack of oxytocin and intravenous fluids. It's now two months since the drugs were delivered to those facilities” (midwife in-charge, Lira RRH).

According to some patients and their relatives, health facilities in the urban areas are mainly privately owned and often do not experience stock-outs of medicines, but they are too costly for the poor population. The slum-dwellers, who are largely poor, are served by the public RRHs. The typical pathways of MDs and MNMs that we observed for MDs from urban areas are not different from the remote areas, mainly due to lack of tracer medicines and medical supplies.

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3 *“It’s true, sometimes we get bad outcomes of the mother or baby because of drug stock-outs.*
4 *Remember these are very poor women from the slums. What do you do if a mother can not buy*
5 *medicines from the private pharmacies in times of stock-out and yet she is actively bleeding?”*
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8 *(Midwife, Lira RRH)*
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10 **Lack of blood and functionality of the operating theatres**

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13 According to the health system in Uganda, all the H/C IVs and hospitals are supposed to offer
14 CEmONC. This requires that they have facilities to perform emergency caesarean sections and blood
15 transfusion. The stakeholders that we interviewed reported that these facilities are not fully functional
16 in some areas. Some health workers and attendants reported blood shortage being worse during
17 holidays since students comprise the largest number of donors. Some patients and attendants reported
18 waiting for blood or being referred to another health facility during times of blood-scarcity.
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22 *"We reached at 8.00 pm but had to wait for 4 hours for blood. There was only one unit from the blood*
23 *bank, yet they needed four units so that the operation could be done. She was bleeding too much and*
24 *died on the way here." (Husband of an MD case, Lacor Hospital)*
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30 As illustrated in Figure 3, lack of blood was noted across all levels of facilities including Lacor hospital
31 and other tertiary hospitals.
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34 By design, all the H/C IVs have operating theatres but some are not fully functional. Lack of
35 anaesthetists, spinal anaesthesia drugs, and needles was cited as reasons for the non-functionality of the
36 operating theatres as illustrated by a case in Figure 4.
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40 *"We get so many referrals from H/C IVs for emergency Caesarean section; of course with bad*
41 *outcomes quite often. At least for us here patients can buy some drugs from the pharmacies in case of*
42 *stock-outs, which is not the case in the villages where the H/C IVs are"* (Midwife, Lira University
43 *Teaching Hospital)*
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47 **Gaps in staff coverage**

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49 Gaps in staff coverage were referred to as a "chronic" problem across all public health facilities by
50 most non-facility based KIs. For most of the lower H/Cs, the KIs reported that the only available
51 midwife in each facility is most times away for training and workshops leaving only nursing
52 assistants who largely lack midwifery training. In most CEmONC facilities, the doctors and
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3 anesthetists are sometimes not available on weekends and public holidays. The stakeholders
4 attributed this to lack of supervision by the facility in-charges and the district health officers.
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8 *"There is no H/C IV that is fully functional. Well, the structures are there but the personnel are not*
9 *available full time especially on weekends and at night. For example, doctors. It's not easy to find*
10 *them full time at work. I was told to wait until Monday... Imagine, I would be dead now"* (MNM
11 *case, Lira RRHI)*
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17 In the analysis of the pathways, skilled personnel are critical in executing timely interventions to treat
18 or refer. Figure 5 illustrates a delay to treat and refer. Some facilities often close their maternity units
19 when the midwives are not available making patients seek alternative care from the TBAs and religious
20 leaders (Figure 6 and Figure 7)
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25 **Skills of the staff**

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27 Skilled birth attendants are necessary for early identification and management of obstetric
28 complications as indicated by facility in-charges. Many patients and their attendants reported that
29 midwives take too long to intervene, including referral to a higher facility when needed. Some
30 MNMs reported that they had to demand referrals, but ended up with bad outcomes.
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36 *"Last week, I laboured for four days at the health facility. I told the midwife that this is not how my*
37 *labour has always been [...]. She said that I was pretending and that everything was fine because*
38 *some labours take long like that.... I had a sharp pain then started bleeding seriously, she then told*
39 *us to go to the main hospital. ... my womb was torn already and they removed it. I thank God that*
40 *I'm still alive."* (MNM case, Lacor Hospital)
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46 During the KI interviews, some stakeholders pointed out training gaps among doctors and midwives.
47 As a result, the health workers have knowledge and skill gaps and often take long to intervene;
48 causing unnecessary delays.
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3 *“... the midwives and doctors of these days are ‘half baked.’ They are very slow and take long to*
4 *decide. They can’t handle emergencies because you have to act fast” (Ward in-charge, Lacor*
5 *Hospital).*
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10 A critical training gap was reported in some privately-owned midwifery schools that lack teaching
11 hospitals. A midwife supervisor also cited a lack of internship for certificate and diploma midwives.
12 Figure 8 illustrates a possible gap in skills where a midwife kept a mother in active labour for three
13 days.
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18 **Delays in the referral system**

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21 There were reports of inter-facility delays due to the unfavourable state of the roads. According to the
22 ambulance drivers, most roads that link the BEmONC facilities to CEmONC facilities are almost impassable,
23 especially during rainy seasons. The roads usually flood when it rains heavily. This leads to a delay during the
24 referral process.
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28 *“I’ve not gone to many places to see how bad the roads are. But when it rains, the roads are*
29 *impassable. We usually delay so much on the road and if it is a bad emergency, the mother can even*
30 *lose the baby” (Ambulance driver, Lacor Hospital)*
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35 Many midwives were also concerned about delays to access ambulances. They attributed this to the
36 centralised ambulance system. For the case of Lacor hospital and its satellite H/Cs, the ambulance
37 system is designed in such a way that they are stationed at the main hospital. In case of any
38 emergency at the lower H/Cs, the ambulance is called from the main hospital, which is on average
39 70 km away. There is usually some delay owing to the bad roads in the remote areas where these
40 H/Cs are located.
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47 *“For quality and quick response, we are not yet a hundred percent, because you can imagine a*
48 *mother with cord prolapse is in Amuru, 75 kilometers away, then they discover, they have to call*
49 *here [Lacor Hospital]. So, there are delays sometimes. Some emergencies don’t need any delay at*
50 *all.” (Midwife, Lacor Hospital)*
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3 The system for government facilities is not any different. The ambulances are stationed at the
4 regional referral and district hospitals, but they have inadequate fuel most times.
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8 *“For us, we have to call the district hospital for the ambulance. But you have to wait until the*
9 *attendants get money for fuel” (Midwife from H/C III, who escorted a d mother referred to Lira*
10 *RRH)*
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15 It was reported that some patients are so poor and can spend the whole day trying to raise money for
16 fuel. In some cases, they have to first go back home and sell land or animals.
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20 **Zigzagging referrals**

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22 In one of the pathways, we also noted a back and forth referral pattern. As illustrated in Figure 9,
23 each facility refers to the other in a zigzagging manner after failing to carry out a diagnostic test or
24 an operation.
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28 **Discussion:**

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30 Although maternal deaths and near-misses have been largely studied with a major focus on
31 biological causes of death, this study elucidated some intriguing reasons why mothers die even after
32 making early contact with formal healthcare. In the pathways that we analysed, all the women took
33 much longer than the common threshold while at the health facilities and got complications. This is
34 consistent with the definition of the duration of the third delay by Edson et al [24]. The pathways to
35 maternal mortality are highly influenced by a shortage of medicines and supplies necessary for
36 signal functions of EmONC. Typically, patients and attendants are “shuffled around” to buy
37 medicines and supplies; causing significant delays similar to findings from other LMICs [25, 26].
38 Because most lower facilities lack medicines and supplies, some women had to trek across districts
39 to access BEmONC services. This is contrary to the WHO recommendation of accessibility within 5
40 kilometres [27].
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51 As illustrated in the various pathways in this study, women who require CEmONC services often
52 face significant challenges. Similar to most LMICs, lack of blood and blood products, gaps in
53 coverage by doctors and anesthetists, and power outages were major hindrances to accessing
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3 emergency operations [28, 29]. Even in cases where emergency caesarean sections were done, it
4 took longer than the thirty-minute to the one-hour interval of the decision to knife-on-skin as
5 stipulated in some guidelines [30, 31].
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9 The pathways described in this study show that women experience significant “passive delays” due
10 to limited practical capacity to identify and treat obstetric emergencies even in facilities with a fair
11 stock of EmONC tracer drugs. Similarly, a study done in Kenya found that the availability of signal
12 functions alone does not directly translate into a readiness to manage obstetric emergencies, but
13 rather a clinical cascade that involves the ability to identify the emergency, treat it, and monitor-
14 modify therapy [32]. Women who were first assessed by personnel with suboptimal midwifery skills
15 like general nurses, nursing assistants, and TBAs were likely to die in most of the pathways. Some
16 studies have found that these women receive wrong medicines, are not monitored, and are often
17 referred late [33, 34].
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25 Evidence from LMICs shows that most BEmONC facilities refer between 60-80% of their patients
26 to CEmONC facilities [35-37]. A good referral system is therefore very important for good maternal
27 and neonatal outcomes [38, 39]. Similar to a study by Elmusharaf *et al* 2017, our study elucidated
28 four patterns of delays in the inter-facility referrals: delay in deciding to refer, referral through
29 multiple non-functioning CEmONC facilities, back-and-forth referrals, and by-passing CEmONC
30 facilities that are deemed non-functional [40]. The major point of delay in the referral system was
31 the first point of care and often related to the capacity to identify complications promptly as
32 highlighted in some studies [40, 41].
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40 This study had some limitations that warrant cautious generalisation of the findings. We carried out
41 all the interviews at the health facilities and this may pose response bias. However, we compared
42 responses from respondents along similar pathways to eliminate gross response bias. Secondly, part
43 of this study focused on the referral system, the addition of two tertiary facilities in Lira without
44 additional step-down health centres might be a limitation to saturation of data and might not fully
45 present the PHCC experience. Additionally, critical case sampling could be biased by the
46 researchers’ selection interests. However, the researchers used independent MPDSR teams at the
47 tertiary hospitals to identify the cases based on the principles of analytical generalisation. Overall,
48 the concept and understanding used in this study are transferable.
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Conclusion:

This study elucidated pathways typically characterised by delays at the health facilities. These pathways provide a novel framework to assess, track and improve the health facility's practical readiness to identify and treat obstetric emergencies. For example, health workers can work with mothers during the antenatal period to identify suitable blood donors and include this on the antenatal chart or engage with Uganda Midwives and Nurses Council to address gaps in midwifery training like access to teaching hospitals and internship opportunities. The pathways also provide a qualitative, critical approach to clearly describe the third delay.

Availability of data and materials:

The materials presented here can be got from the corresponding author upon reasonable request.

Conflict of interest:

The authors declare no conflict of interest.

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Author contributions:

GA, AM, and EO conceived the idea and wrote the design. VN and GA collected data. GA and EO carried out data analysis and writing the manuscript. PB and JB did the overall review and editing.

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Figure legend:

Figure 1 Barriers along the pathway to receive care after reaching the health facility.

Figure 2 Delayed referral and by-passing non-functional facility. She experienced headache for two weeks at home before going to the H/C II where a diagnosis of severe pre-eclampsia was made. There were no antihypertensive and anticonvulsants. She was referred to the nearby H/C IV but after calling the midwife in-charge they were told that theatre is closed because of no anesthetic drugs. They decided to by-pass this health centre and move to Lacor hospital, about 90 km away. At Lacor hospital, she received anticonvulsants and antihypertensive. She was taken to the operating room for an emergency caesarean section where a live baby was delivered. The mother was discharged alive but with a stroke. (MNM1).

Figure 3 Lack of blood. She experienced labour pains for one day and bleeding for 4 hours before going to the Regional Referral Hospital. She had a fresh stillbirth and developed post-partum hemorrhage. The doctor requested three units of blood but there was no blood. She was referred to Lacor Hospital with severe anaemia. At Lacor Hospital there was no blood as well; she died at the admission point. (MD1).

Figure 4 Multiple referrals across non-functional CEmONC facilities. She had antepartum hemorrhage (APH) and went to the H/C IV but the midwife referred her to the District Hospital for an ultrasound scan; it confirmed complete placenta praevia. A decision to do an emergency caesarean section was made but the operating room did not have electricity prompting referral to the Regional Referral Hospital (RRH). At the RRH she spent six hours looking for money to buy drugs for anesthesia. After failing to get the money, she was verbally referred to Lacor Hospital but had bled a lot and died of hemorrhagic shock. (MD2).

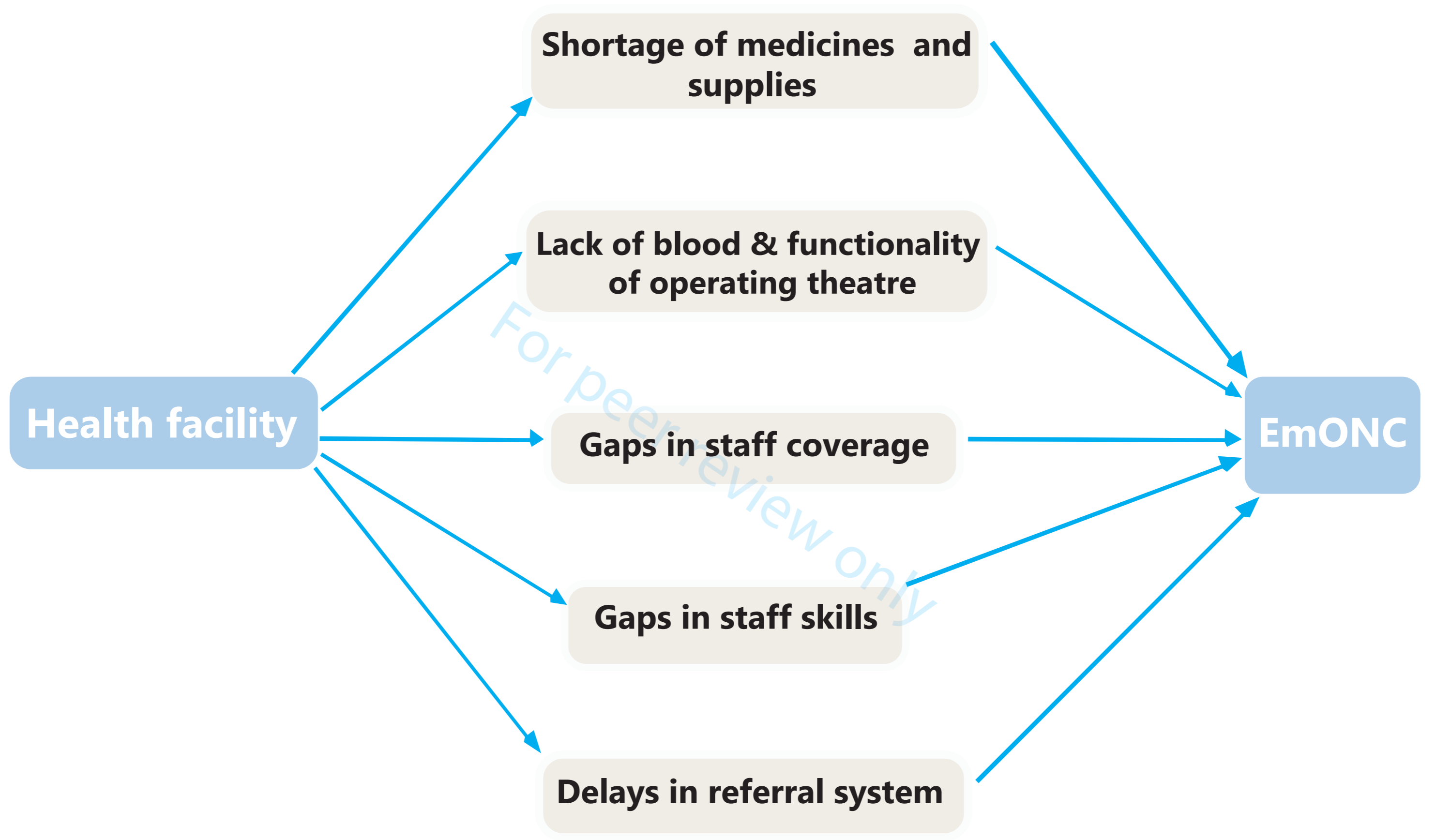
Figure 5 Delayed referral and operation. At the health centre III, there was no midwife. The nurse who attended to her did not plot a partograph and kept her for 3 days. The patient requested a referral to H/C IV where she was found to have obstructed labour but there was no doctor to do a caesarean section. She was referred to Lacor hospital with prolonged obstructed labour and a dead foetus. Emergency caesarean section was done, taken to the intensive care unit (ICU), but got sepsis and died. (MD3).

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3 **Figure 6** Non-functional facility and seeking care from the TBA. She had labour pain for 3 hours
4 then went to the TBA because the nearby H/C III had no midwife. The TBA kept her for two days
5 until she failed to deliver. The mother was referred to the district hospital but the doctor was not
6 available over the weekend prompting referral to Lacor hospital. She had a ruptured uterus and died
7 of septic shock 4 days after the operation. (MD4)
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12 **Figure 7** Non-functional BEmONC facility and seeking care from the religious leader. The woman
13 suddenly collapsed from the garden. She was taken to the H/C III and found the maternity unit
14 closed because there was no midwife. After two episodes of convulsions, the husband gave her raw
15 eggs and inserted a spoon in the mouth to stop her from biting the tongue. The mother-in-law
16 advised that the woman should be taken for prayers at the pastor's place since the condition could be
17 related to evil spirits. She spent six hours with the pastor but continued to fit. When she deteriorated,
18 the husband rushed her to Lacor hospital where the blood pressure was found to be very high. She
19 was given treatment but died after 30 minutes due to eclampsia. A perimortem operation was done
20 and extracted a live baby. (MD5).
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28 **Figure 8** Skills of the health workers. She experienced labour pain for two days before going to the
29 health centre. The midwife received her and gave her a bed without proper assessment. After three
30 days of active contractions and exhaustion, the attendants requested a referral to Lacor hospital. She
31 arrived at Lacor hospital with a ruptured uterus and was discharged with a vesicovaginal fistula.
32 (MNM2).
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38 **Figure 9** Back and forth referral due to lack of diagnostics. She had an unsafe abortion then went to
39 H/C IV. The doctor reviewed and started her on antibiotics and intravenous fluids. She was referred
40 to the district hospital for an abdominal ultrasound scan and complete blood count. Unfortunately,
41 these investigations could not be done. She was again referred to a private medical centre for an
42 ultrasound scan that showed massive pyoperitoneum. The operation could not be done because there
43 was no electricity. The family requested a referral to Lacor hospital where the operation was done;
44 the uterus was removed and discharged alive after 5 days. (MNM3).
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Delays at the facility

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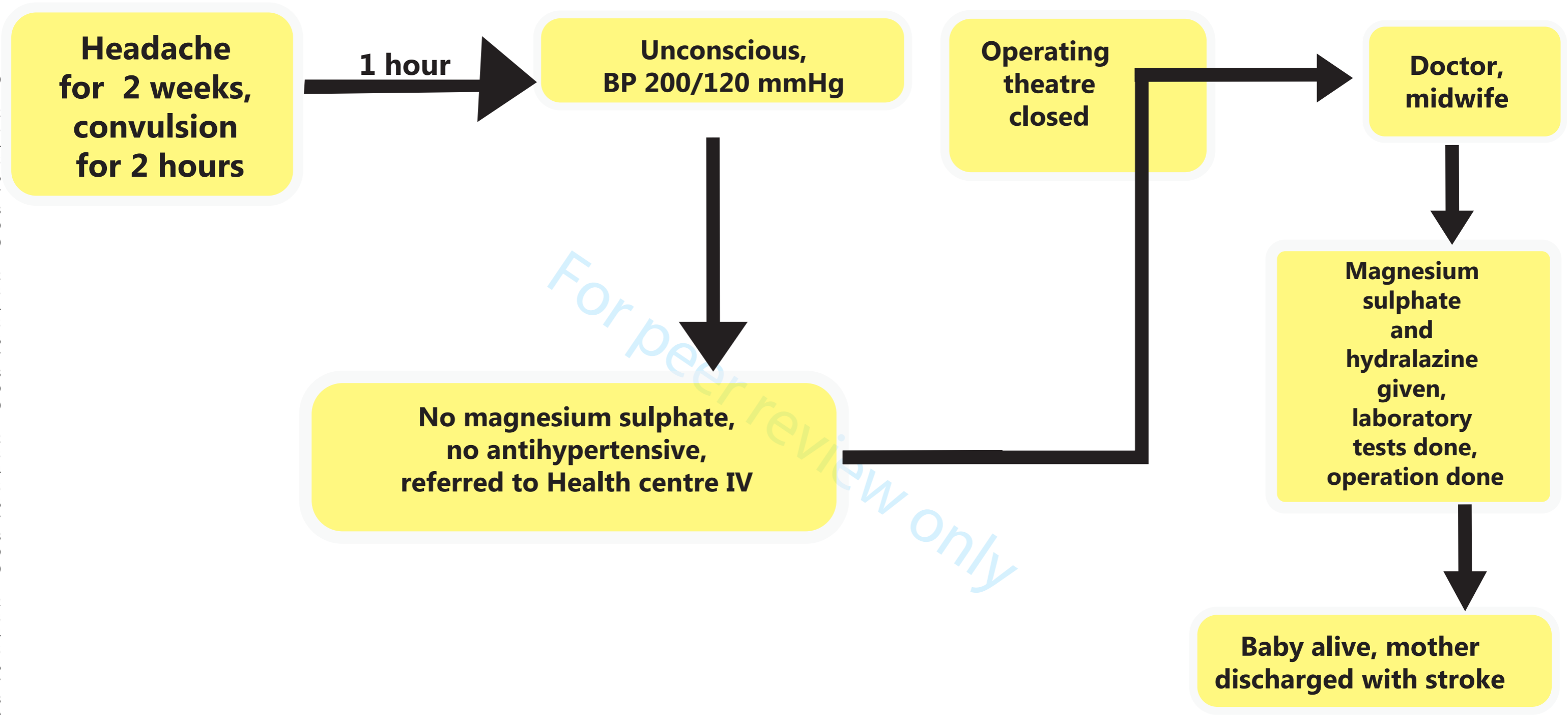
Woman's home

Health centre II

Health centre IV

Lacor Hospital

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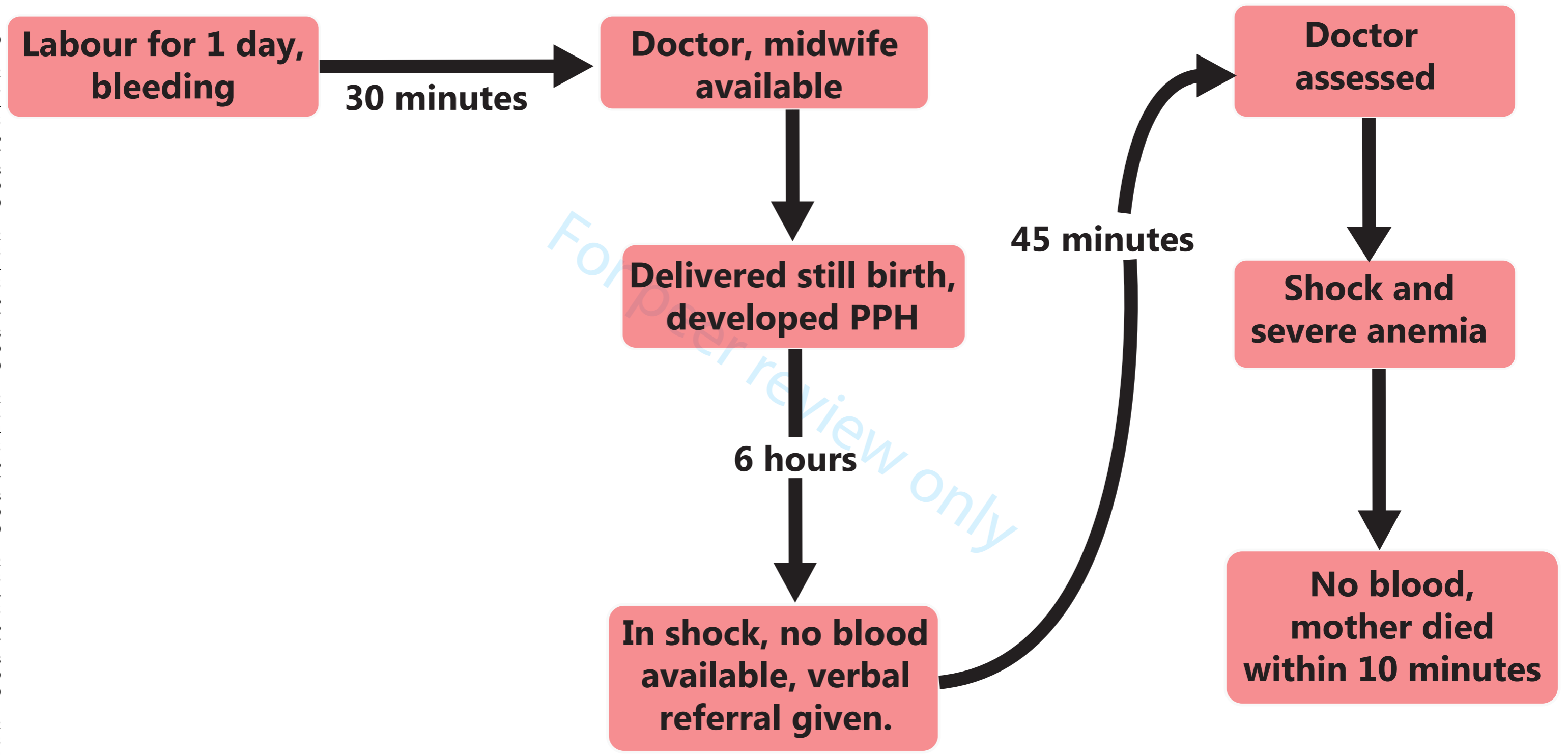


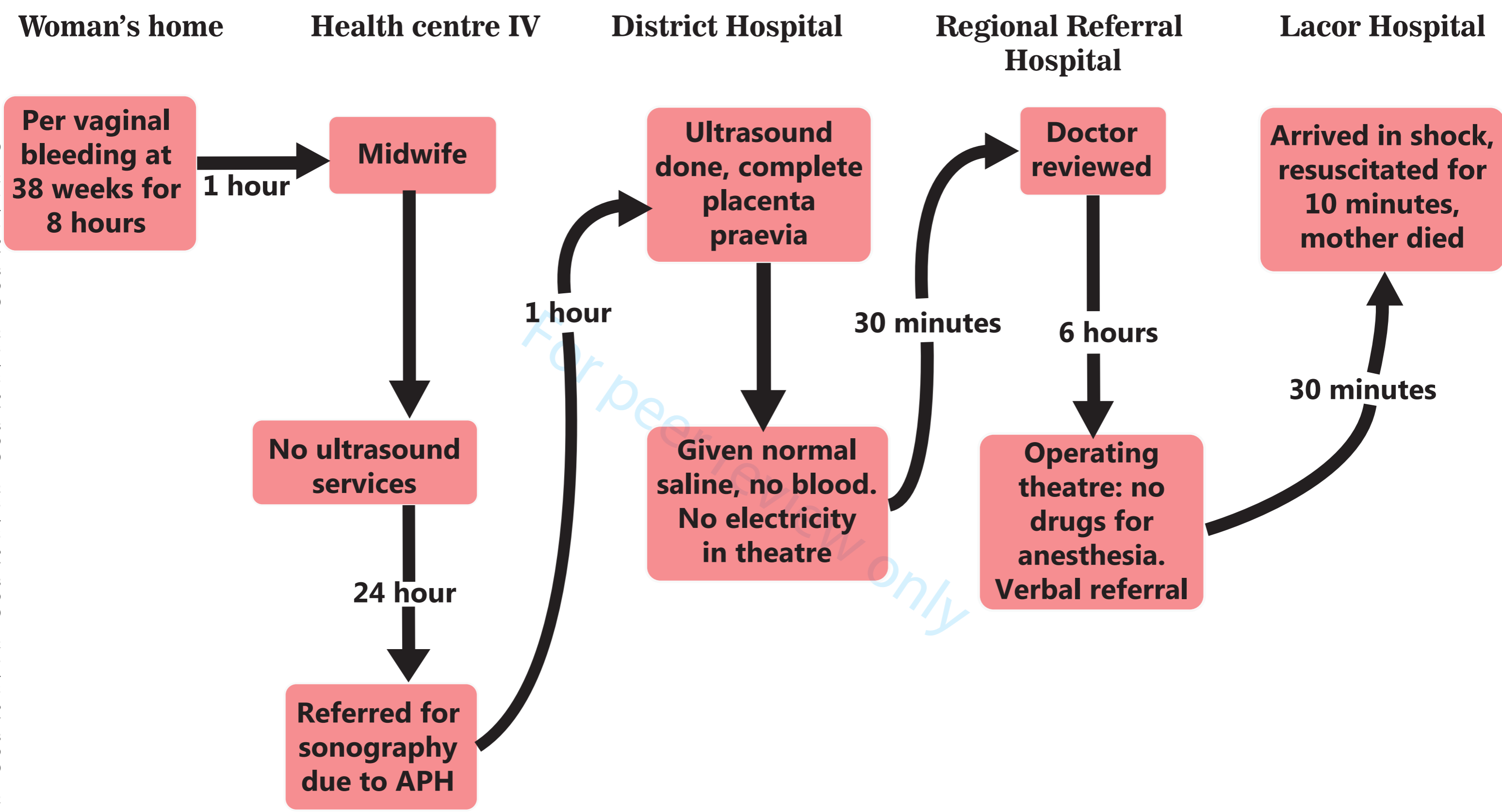
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Woman's home

Regional Referral Hospital

Lacor Hospital





Woman's home

Health centre III

Health centre IV

Lacor Hospital

**16 year old
prime gravida**

**Nurse available,
no midwife**

**Midwife available,
no doctor
(weekend)**

**Midwife and
doctor
available**

**Labour pains
for 5 hours**

**Failed to
deliver,
Referred to
H/C IV**

**Assessed by
midwife
and started on
patograph**

**Obstructed labour,
IUFD, ruptured
uterus**

**Laparotomy,
still birth,
necrotic uterus,
hysterectomy done**

**Obstructed labour,
operating theatre
not functional**

**To ICU, septic shock,
died 7 days later**

1 hour

3 days

1 hour

5 hours

30 minutes

8 hours

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Woman's home

TBA's house

District Hospital

Lacor Hospital

Labour pain for 3 hours



TBA

2 days

Failed to deliver

1 hour



Nurse



No doctor



Midwife



Obstructed labour

2 hours



Midwife Doctor



Operating theatre, ruptured uterus



ICU, septic shock, mother died

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Garden

Health centre III

Pastor's Home

Lacor Hospital

**Woman,
36 weeks
pregnant,
sudden
collapse**

30 min

**Convulsions
2 times.
Maternity
closed**

**Raw eggs,
spoon inserted
in mouth by
husband**

30 min

**6 hours,
convulsions
4 times**

→

**Unconscious, BP
200/120 mmHg**

↓

**Magnesium
sulphate and
hydralazine given**

↓

**Cardiac arrest,
mother died.**

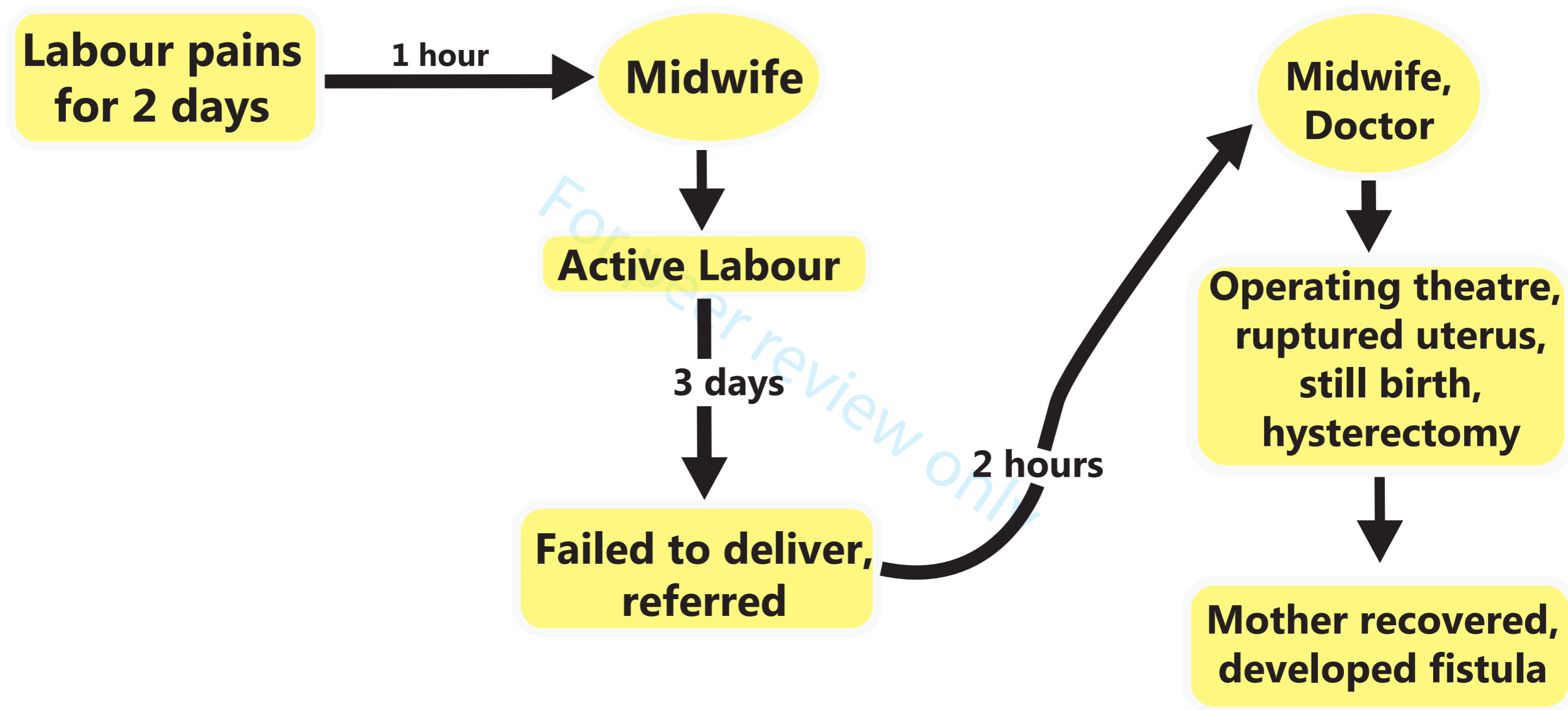
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Woman's home

Health centre III

Lacor Hospital



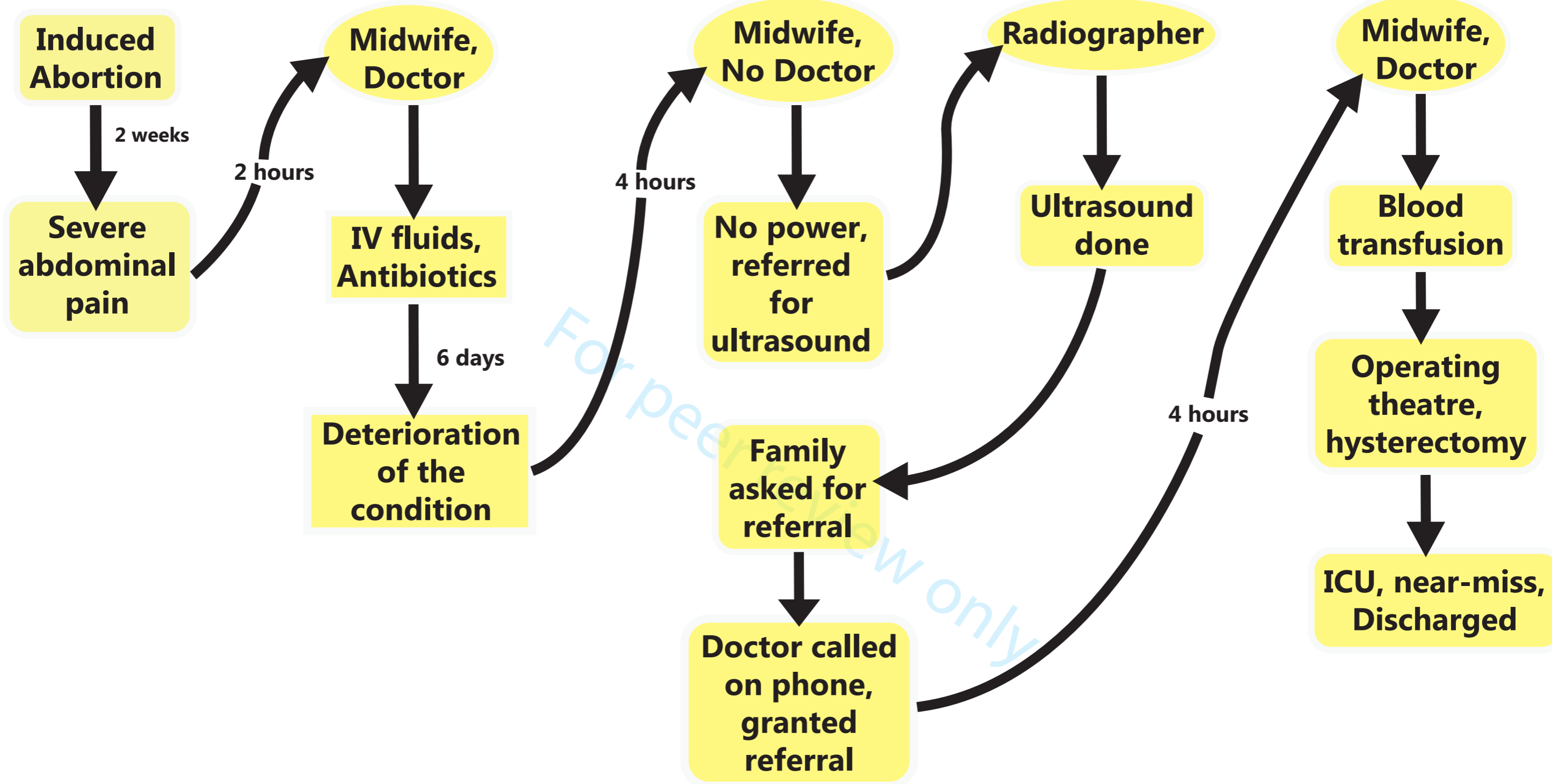
Woman's home

At Health centre IV

District Hospital

Private Clinic

Lacor Hospital



STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			5
Study design	4	Present key elements of study design early in the paper	5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	6
Bias	9	Describe any efforts to address potential sources of bias	6
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	N/A
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	6
		(b) Describe any methods used to examine subgroups and interactions	N/A
		(c) Explain how missing data were addressed	6
		(d) If applicable, describe analytical methods taking account of sampling strategy	N/A
		(e) Describe any sensitivity analyses	
Results			7-11

Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	N/A
		(b) Give reasons for non-participation at each stage	N/A
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	N/A
		(b) Indicate number of participants with missing data for each variable of interest	N/A
Outcome data	15*	Report numbers of outcome events or summary measures	N/A
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	
		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			12-13
Key results	18	Summarise key results with reference to study objectives	12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	13
Generalisability	21	Discuss the transferability of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

BMJ Open

Why women die after reaching the hospital: a qualitative critical incident analysis of the “third delay” in post-conflict northern Uganda.

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Why women die after reaching the hospital: a qualitative critical incident analysis of the "third delay" in post-conflict northern Uganda.

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Abstract

Objective: To critically explore and describe the pathways that women who require emergency obstetrics and newborn care (EmONC) go through, and to understand the delays in accessing EmONC after reaching a health facility in a conflict-affected setting.

Design: This was a qualitative study with two units of analysis: (1) Critical Incident Technique (CIT) (2) Key informant (KI) interviews with health workers, patients, and attendants.

Setting: Thirteen Primary Health Care Centres (PHCCs), one general private-not-for-profit hospital, one Regional Referral Hospital (RRH), and one teaching hospital in northern Uganda.

Participants: Forty-nine purposively selected health workers, patients, and attendants participated in KI interviews (KII). CIT mapped pathways for maternal deaths and near-misses selected based on critical case purposive sampling.

Results: After reaching the health facility, a pregnant woman goes through a complex pathway that leads to delays to receive EmONC. Five reasons were identified for these delays: a shortage of medicines and supplies, lack of blood and functionality of the operating theatres, gaps in staff coverage, gaps in staff skills, and delays in the inter-facility referral system. Shortage of medicines and supplies was central in most of the pathways characterised by three patterns: delay to treat, back-and-forth movements to buy medicines or supplies, and multiple referrals across facilities. Some women also by-passed facilities they deemed to be non-functional.

Conclusion: Our findings show that the pathway to EmONC is precarious and takes too long even after making early contact with the health facility. The need to skill and manage better the meagre human resource, and to avail essential medical supplies in health facilities may help to reduce the gaps in a facility's emergency readiness and thus improve maternal and neonatal outcomes.

Keywords: Maternal Death, Maternal Near Miss, Third Delay, EmONC, Critical Incident Technique, Northern Uganda.

Word count: 3987

Article summary

Strengths and limitations of this study:

- This qualitative study utilized two methods of data collection for diagrammatic and thematic analyses, CIT and KII. These are complementary and yield richer data for realist enquiry.
- CIT comprehensively mapped pathways typically followed by cases of maternal deaths and maternal near-misses in similar settings based on critical case purposive sampling.
- There were limitations to this study:
 - we conducted all the interviews within the health facilities which might have influenced some responses.
 - Part of this study focused on the referral system, but the addition of two tertiary facilities in Lira without additional step-down health centres might be a limitation to saturation of data and might not fully present the PHCC experience.
 - Critical case sampling could be biased by the researchers' selection interests. However, the researchers used independent maternal and perinatal death surveillance and response (MPDSR) teams at the tertiary hospitals to identify the cases based on the principles of analytical generalisation.

Background:

Globally, maternal mortality is still unacceptably high. By 2017, about 295,000 women were still dying every year [1]. More than half of the global maternal mortality occurs in Sub-Saharan Africa, and about a third in South Asia [1, 2]. These regions include fragile, humanitarian, and post-conflict areas [3].

In Uganda, maternal mortality ratio declined modestly between 2011 and 2016 from 438 to 336, but with regional differences due to variations in social determinants of health [4, 5]. For example, northern Uganda is a post-conflict area and currently host to refugees from South Sudan; these circumstances have exacerbated food insecurity and constrained resources for health with possible suboptimal maternal healthcare in the region [6, 7]. The leading causes of maternal death are direct obstetric causes and include haemorrhage, infection, hypertensive disorders, uterine rupture, and abortion complications [8, 9]. Malaria and HIV/AIDS contribute significantly to the indirect causes of maternal deaths in Uganda [10].

Several delays also exist along the pathway to care. The “three delays” model has been widely used to understand the factors that underlie maternal deaths [11]. The first delay is a delay in deciding to seek clinical care during an obstetric emergency, the second delay is a delay in reaching the health facility, and the third delay is a delay in receiving appropriate care while at the health facility.

Compared to the first and second delays, the third delay has been under-documented and under-researched with only a few in-depth and critical analyses of the pathways followed by women with obstetric complications [12, 13]. Moreover, the met need for emergency obstetrics and newborn care (EmONC) in some post-conflict regions, and in Low and Middle Income Countries (LMICs) generally, is still very low [14-17]. In the context of Uganda, a low-income country which is conflict-affected with fragile health and referral systems, it is possible to hypothesize significant delays in receiving EmONC even after arriving at a health facility. Such delays could lead to poor maternal and newborn outcomes. Therefore, the purpose of this study was to (1) explore and describe the pathways that women who require EmONC go through after deciding to seek care; (2) understand the delays in accessing EmONC after reaching a health facility.

Methods:

Study design

This qualitative study utilised an embedded study design with two units of analysis: (1) Critical Incident analysis of maternal deaths (MD) and maternal near misses (MNM), (2) Key-informant interviews (KII) with persons who were perceived to know about the maternal health care by their roles as health workers or experience with the health system. The critical incident technique (CIT) was first described by Flanagan in 1954 as a way of collecting specific and significant behavioural facts thus giving a solid basis for making inferences [18]. It has been used as a qualitative methodology in health systems research, that is useful for exploring barriers to quality care or to achieving satisfaction with care provision [19]. It involves the analysis of specific incidents to determine what actions or behaviors could '*lead to the best possible outcome of a given situation*' [20]. The use of CIT complements KII by drawing on more specific experiences thereby eliciting richer data for realist enquiry [21].

Study setting and population

Northern Uganda has an estimated population of 7.1 million, and a total fertility rate of 5.4 children per woman [5]. The first part of this study was carried out in northern Uganda to explore the pathway to care for mothers accessing EmONC services through the referral system to Lacor Hospital. The hospital is located in Gulu district in the post-conflict Acholi sub-region, west of northern Uganda. It provides comprehensive EmONC (CEmONC) services and also serves as a referral site for the greater northern Uganda. It has three satellite level 3 health centres within an average distance of 60 kilometers - Pabbo, Opit, and Amuru that offer basic EmONC (BEmONC) services. The main means of transport is the motorcycle because of poor road networks. A second part of the study was carried out at Lira Regional Referral Hospital and Lira University Teaching Hospital in the Lango sub-region, east of northern Uganda. The addition of these two tertiary facilities aimed to increase the number of participants to achieve saturation. The population used in the CIT and KII included: patients' relatives and attendants, facility-based KIs, and the patients themselves for MNM.

Sampling and participants

Key-informants

We used a purposive sampling technique to identify and recruit the first few KIs who were healthcare workers as well as unit in-charges and attendants with knowledge of the critical incidents or members of the maternal and perinatal death surveillance and response (MPDSR) teams at Lacor Hospital, Lira Regional Referral Hospital, and Lira University Teaching Hospital. This was followed by a snowball technique to identify further KIs including ambulance drivers, midwives, patients, and relatives who also participated in care during the critical incidents. During data collection, we also identified other KIs in the above categories who accepted to participate in this study. A total of forty-nine KIs took part in this study (Table 1).

Critical incidents

We used critical case purposive sampling to identify the cases. We restricted ourselves to maternal death and maternal near miss as critical incidents. Critical case sampling has been described as “a method where selected important or critical cases are examined based on the following: ‘If it happens there, will it happen anywhere?’ or ‘if that group is having problems, then can we be sure all the groups are having problems?’” [22]. The MPDSR teams of the hospitals identified a total of fifty cases that had complete records and met the criteria for critical case purposive sampling. To enhance the transferability of the findings, we only included eight MDs and fifteen MNMs that went through the referral system in more than two facilities, except for the Lango sub-region.

Table 1 Key-informants interviewed

Category	Acholi sub-region	Lango sub-region	Total
Doctors	3	2	5
Midwives	6	3	9
Ambulance drivers	2	1	3
Patients	9	6	15
Attendants	11	6	17

Data collection

We conducted interviews after an initial process of informed consent from all the participants which was verbal because the study presented no more than minimal risk or harm and, in the case of family members, to minimise the intrusiveness of the process at a time of grieving. The interviews and mapping of the pathways were conducted from November 2017 to December 2019 in the Acholi sub-region. Additional mapping of pathways for cases and interviews at the two tertiary hospitals in the Lango sub-region were done in June 2020. The interviews were scheduled at a time agreed upon with each interviewee, and all took place at the hospitals and within two weeks of the occurrence of the MD and MNM to avoid a potential loss to follow-up and recall bias. For the CIT, each interview began with self-introduction since some participants were not known to the interviewers followed by the collection of the demographic and family background information. In all the cases, semi-structured interviews were carried out in Luo for the patients and their relatives or attendants and in English for the health workers. For each case, we conducted group or individual interviews, as chosen by the participants. The former case involved one respondent narrating the entire series of events surrounding a critical incident, followed by a further inquiry or additional contribution from the members. The four guiding questions were: ‘when did (name of the woman) start having labour pains or feeling unwell?’ ‘where did she go to?’ ‘how did she reach there and how long did she take?’ ‘what happened on arrival at the facility?’ However, the interviewers allowed participants to express themselves freely, audio-recorded or took systematic notes (with the verbal permission of the respondent), and where possible, sketched a diagrammatic pathway for each case. Additional questions were also asked regarding (antenatal care) ANC attendance, risk factors. For the facility in-charges, we asked questions related to quality and accessibility to EmONC services in northern Uganda. Before concluding each interview, the interviewers revisited the diagrammatic pathways to clarify any remaining uncertainties or gaps and member checking where necessary. All the interviews were concluded by asking the interviewees for recommendations to improve EmONC services with a focus on reducing the third delay then thanking the participants (Supplementary file).

Data analysis

All the interviews were transcribed and translated into English. The transcripts were read through several times to identify the major themes and become familiar with the content. The pathways to care were mapped for each case from onset of labour pains or danger signs to discharge whether

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3 alive or dead, with a major focus on the time while at the health facilities. This mapping helped to
4 identify key events like decisions and decision-makers, transport means, points of referrals,
5 timeframes, and geographical locations of these critical cases. A critical incident report that merged
6 data from CIT and KII was then developed, followed by mapping of the pathway for each case. To
7 add to its rigor, this pathway-analysis was also looked at by other members of the team. We
8 completed the mapping of the incidents by hand and Excel Shapes once the team members agreed on
9 its accuracy. A thematic inductive analysis was used for the KII. We followed the six steps of
10 thematic analysis: familiarisation, coding, generating themes, reviewing themes, defining and
11 naming themes, then writing up [23]. NVivo 10 software was used to manage the data.
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19 **Patient and Public Involvement:**

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21 The concept and design of this research were informed by experiences shared by patients and care-
22 takers during routine care for childbirth. We have shared the results, especially critical incidents,
23 with the district and national stakeholders.
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27 **Ethical consideration**

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29 This study was approved by the Lacor Hospital Institutional Research Ethics Committee
30 (LHIREC) and the Uganda National Council for Science and Technology, within the Mother and
31 Child Health Lacor and South Sudan (MoChELaSS) project. We obtained verbal consent from all
32 the participants and this was specially approved by LHIREC since the study had no more than
33 minimal risk or harm. The interviewers took into consideration the sensitive issues that surround
34 deaths in most cultures of northern Uganda. Whenever the interviewees showed any sign of
35 emotional distress, the interviews were adjourned.
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Results:

After analysing the pathways from the CIT and data from the KII, we found that a pregnant woman goes through a complex pathway that leads to delays to receive care while at the health facility sometimes with sub-optimal outcomes. Underlying these delays were a shortage of medicines and supplies, lack of blood, gaps in staff coverage and skills in managing obstetric emergencies, and barriers in the referral system as summarised in Figure 1. The CIT elucidated similar pathways of maternal mortality in all the selected cases: delay to treat, back-and-forth movements to buy medicines or supplies, and referral across multiple facilities that were deemed non-functional. Some women bypassed facilities they perceived to be non-functional or sought care from traditional birth attendants (TBAs) and religious leaders.

Shortage of medicines and supplies

A midwife reported that patients sometimes buy emergency medicines like oxytocin and magnesium sulphate as they wait for the next delivery of medicines and supplies from the national medical store. Some KIs cited a severe shortage of supplies like gloves, fluid giving sets, urinary catheters, and intravenous cannulas as some of the reasons for the delay to receive EmONC services. As a result, a lot of time is wasted trying to raise money to buy these supplies.

“She was in labour for two days at the health centre. When we reached the regional referral hospital, they told us to buy gloves and a tube for urine. The husband ran home to borrow money. When he came back the doctor told us that the womb had ruptured and that we use that money to go to Lacor Hospital. It's bad, she died” (mother-in-law of an MD case, Lacor Hospital)

Lack of antihypertensives and anticonvulsants was a common problem in BEmONC facilities while CEmONC facilities lack anaesthetic drugs and spinal needles. For example, Figure 2 illustrates a delay to receive emergency medications for hypertensive disorders and by-passing facilities with non-functional operating theatres.

Depending on the geographical location, the nearest health facility where a woman in the village could get EmONC is a PHCC health centre (H/C) II or III serviced by a midwife and clinical officer. However, most of the PHCCs in the region are not fully functional because of frequent stock-outs of

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3 EmONC signal function drugs. As a result, the EmONC services are mainly offered by the tertiary
4 level facilities that include the RRHs and NRH.

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7 *"We are now receiving very many referrals from the lower H/Cs due to lack of oxytocin and*
8 *intravenous fluids. It's now two months since the drugs were delivered to those facilities"* (Midwife,
9 *Lira RRH*).
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13 According to some patients and their relatives, health facilities in the urban areas are mainly
14 privately owned and often do not experience stock-outs of medicines, but they are too costly for the
15 poor population. The slum-dwellers, who are largely poor, are served by the public RRHs. The
16 typical pathways of MDs and MNMs that we observed for MDs from urban areas are not different
17 from the remote areas, mainly due to lack of tracer medicines and medical supplies.
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22 *"It's true, sometimes we get bad outcomes of the mother or baby because of drug stock-outs.*
23 *Remember these are very poor women from the slums. What do you do if a mother can not buy*
24 *medicines from the private pharmacies in times of stock-out and yet she is actively bleeding?"*
25 *(Midwife, Lira RRH)*
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29 **Lack of blood and functionality of the operating theatres**

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32 According to the Uganda's health system policies, all level 4 health centres and hospitals are supposed
33 to offer CEmONC. This requires that they have facilities to perform emergency caesarean sections
34 and blood transfusion. The stakeholders that we interviewed reported that these facilities are not fully
35 functional in some areas. Some health workers and attendants reported blood shortage being worse
36 during holidays since students comprise the largest number of donors. Some patients and attendants
37 reported waiting for blood or being referred to another health facility during times of blood-scarcity.
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42 *"We reached at 8.00 pm but had to wait for 4 hours for blood. There was only one unit from the blood*
43 *bank, yet they needed four units so that the operation could be done. She was bleeding too much and*
44 *died on the way here."* (Husband of an MD case, Lacor Hospital)
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49 As illustrated in Figure 3, lack of blood was noted across all levels of facilities including Lacor hospital
50 and other tertiary hospitals.
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3 By design, all the H/C IVs have operating theatres but some are not fully functional. Lack of
4 anaesthetists, spinal anaesthesia drugs, and needles was cited as reasons for the non-functionality of
5 the operating theatres as illustrated by a case in Figure 4.
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9 *"We get so many referrals from H/C IVs for emergency Caesarean section; of course with bad*
10 *outcomes quite often. At least for us here patients can buy some drugs from the pharmacies in case of*
11 *stock-outs, which is not the case in the villages where the H/C IVs are"* (Midwife, Lira University
12 *Teaching Hospital)*
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16 **Gaps in staff coverage**

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18 Gaps in staff coverage were referred to as a "chronic" problem across all public health facilities by
19 most non-facility based KIs. For most of the lower H/Cs, the KIs reported that the only available
20 midwife in each facility is often away for training and workshops leaving only nursing assistants
21 who largely lack midwifery training. In most CEMONC facilities, the doctors and anaesthetists are
22 sometimes not available on weekends or public holidays. The stakeholders attributed this to lack of
23 supervision by the facility in-charges and the district health officers.
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31 *"There is no H/C IV that is fully functional. Well, the structures are there but the personnel are not*
32 *available full time especially on weekends and at night. For example, doctors. It's not easy to find*
33 *them full time at work. I was told to wait until Monday... Imagine, I would be dead now"* (MNM
34 *case, Lira RRH)*
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40 In the analysis of the pathways, skilled personnel are critical in executing timely interventions to treat
41 or refer. Figure 5 illustrates a delay to treat and refer. Some facilities often close their maternity units
42 when the midwives are not available making patients seek alternative care from the TBAs and religious
43 leaders (Figure 6 and Figure 7)
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47 **Skills of the staff**

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49 Skilled birth attendants are necessary for early identification and management of obstetric
50 complications as indicated by facility in-charges. Many patients and their attendants reported that
51 midwives take too long to intervene, including referral to a higher facility when needed. Some
52 women reported that they had to demand referrals, but ended up with bad outcomes.
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5 *“Last week, I laboured for four days at the health facility. I told the midwife that this is not how my*
6 *labour has always been [...]. She said that I was pretending and that everything was fine because*
7 *some labours take long like that.... I had a sharp pain then started bleeding seriously, she then told*
8 *us to go to the main hospital. ... my womb was torn already and they removed it. I thank God that*
9 *I’m still alive.” (MNM case, Lacor Hospital)*

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15 During the KI interviews, some stakeholders pointed out training gaps among doctors and midwives.
16 As a result, the health workers have knowledge and skill gaps and often take long to intervene;
17 causing unnecessary delays.
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22 *“... the midwives and doctors of these days are ‘half baked.’ They are very slow and take long to*
23 *decide. They can’t handle emergencies because you have to act fast” (Midwife, Lacor Hospital).*

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27 A critical training gap was reported in some privately-owned midwifery schools that lack teaching
28 hospitals. A midwife supervisor also cited a lack of internship for certificate and diploma midwives.
29 Figure 8 illustrates a possible gap in skills where a midwife kept a mother in active labour for three
30 days.
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34 35 36 **Delays in the referral system**

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38 There were reports of inter-facility delays due to the unfavourable state of the roads. According to
39 the ambulance drivers, most roads that link the BEmONC facilities to CEmONC facilities are almost
40 impassable, especially during rainy seasons. The roads usually flood when it rains heavily. This
41 leads to a delay during the referral process.
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46 *“I’ve not gone to many places to see how bad the roads are. But when it rains, the roads are*
47 *impassable. We usually delay so much on the road and if it is a bad emergency, the mother can even*
48 *lose the baby” (Ambulance driver, Lacor Hospital)*

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53 Many midwives were also concerned about delays to access ambulances. They attributed this to the
54 centralised ambulance system. For the case of Lacor hospital and its satellite H/Cs, the ambulance
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3 system is designed in such a way that they are stationed at the main hospital. In case of any
4 emergency at the lower H/Cs, the ambulance is called from the main hospital, which is on average
5 70 km away. There is usually some delay owing to the bad roads in the remote areas where these
6 H/Cs are located.
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12 *“For quality and quick response, we are not yet a hundred percent, because you can imagine a*
13 *mother with cord prolapse is in Amuru, 75 kilometers away, then they discover, they have to call*
14 *here [Lacor Hospital]. So, there are delays sometimes. Some emergencies don't need any delay at*
15 *all.” (Midwife, Lacor Hospital)*
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20 The system for government facilities is not any different. The ambulances are stationed at the
21 regional referral and district hospitals, but they have inadequate fuel most times.
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26 *“For us, we have to call the district hospital for the ambulance. But you have to wait until the*
27 *attendants get money for fuel” (Midwife from H/C III, who escorted a d mother referred to Lira*
28 *RRH)*
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32 It was reported that some patients are so poor and can spend the whole day trying to raise money for
33 fuel. In some cases, they have to first go back home and sell land or animals.
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37 38 **Zigzagging referrals**

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40 In one of the pathways, we also noted a back and forth referral pattern. As illustrated in Figure 9,
41 each facility refers to the other in a zigzagging manner after failing to carry out a diagnostic test or
42 an operation.
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Discussion:

Although maternal deaths and near-misses have been largely studied with a major focus on biological causes of death, this study elucidated some intriguing reasons why mothers die even after making early contact with formal healthcare. In the pathways that we analysed, all the women took much longer than the common threshold while at the health facilities and developed complications. This is consistent with the definition of the duration of the third delay by Edson et al [24]. The pathways to maternal mortality are highly influenced by a shortage of medicines and supplies necessary for signal functions of EmONC. Typically, patients and attendants are “shuffled around” to buy medicines and supplies; causing significant delays similar to findings from other LMICs [25, 26]. Because most lower facilities lack medicines and supplies, some women had to trek across districts to access BEmONC services. This is contrary to the WHO recommendation of accessibility within 5 kilometres [27].

As illustrated in the various pathways in this study, women who require CEmONC services often face significant challenges. Similar to most LMICs, lack of blood and blood products, gaps in coverage by doctors and anaesthetists, and power outages were major hindrances to accessing emergency operations [28, 29]. Even in cases where emergency caesarean sections were done, it took longer than the thirty-minute to the one-hour interval of the decision to operation as stipulated in some guidelines [30, 31].

The pathways described in this study show that women experience significant “passive delays” due to limited practical capacity to identify and treat obstetric emergencies even in facilities with a fair stock of EmONC tracer drugs. Similarly, a study done in Kenya found that the availability of signal functions alone does not directly translate into a readiness to manage obstetric emergencies, but rather a clinical cascade that involves the ability to identify the emergency, treat it, and monitor-modify therapy [32]. Women who were first assessed by personnel with suboptimal midwifery skills like general nurses, nursing assistants, and TBAs were likely to die in most of the pathways. Some studies have found that these women receive wrong medicines, are not monitored, and are often referred late [33, 34].

Evidence from LMICs shows that most BEmONC facilities refer between 60-80% of their patients to CEmONC facilities [35-37]. A good referral system is therefore very important for good maternal and neonatal outcomes [38, 39]. Similar to a study by Elmusharaf *et al* 2017, our study elucidated

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3 four patterns of delays in the inter-facility referrals: delay in deciding to refer, referral through
4 multiple non-functioning CEmONC facilities, back-and-forth referrals, and by-passing CEmONC
5 facilities that are deemed non-functional [40]. The major point of delay in the referral system was
6 the first point of care and often related to the capacity to identify complications promptly as
7 highlighted in some studies [40, 41].
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12 This study had some limitations that warrant cautious generalisation of the findings. We carried out
13 all the interviews at the health facilities and this may pose response bias. However, we compared
14 responses from respondents along similar pathways to eliminate gross response bias. Secondly, part
15 of this study focused on the referral system, and the addition of two tertiary facilities in Lira without
16 additional step-down health centres might be a limitation to saturation of data and might not fully
17 present the PHCC experience. Additionally, critical case sampling could be biased by the
18 researchers' selection interests. However, the researchers used independent MPDSR teams at the
19 tertiary hospitals to identify the cases based on the principles of analytical generalisation. Overall,
20 the concept and understanding used in this study are transferable.
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31 **Conclusion:**

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33 This study elucidated pathways typically characterised by delays at the health facilities. These
34 pathways provide a novel framework to assess, track and improve the health facility's practical
35 readiness to identify and treat obstetric emergencies. For example, health workers can work with
36 mothers during the antenatal period to identify suitable blood donors and include this on the
37 antenatal chart or engage with Uganda Midwives and Nurses Council to address gaps in midwifery
38 training like access to teaching hospitals and internship opportunities. The pathways also provide a
39 qualitative, critical approach to clearly describe the third delay.
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Availability of data and materials:

The materials presented here can be got from the corresponding author upon reasonable request.

Conflict of interest:

The authors declare no conflict of interest.

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Author contributions:

GA, AM, and EO conceived the idea and wrote the design. VN and GA collected data. GA and EO carried out data analysis and writing the manuscript. GA, PB, and JB did the overall review and editing. All authors read and approved the final manuscript.

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3 **Figure legend:**
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5 **Figure 1** Barriers along the pathway to receive care after reaching the health facility.
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8 **Figure 2** Delayed referral and by-passing non-functional facility. She experienced headache for two
9 weeks at home before going to the H/C II where a diagnosis of severe pre-eclampsia was made.
10 There were no antihypertensive and anticonvulsants. She was referred to the nearby H/C IV but after
11 calling the midwife in-charge they were told that theatre is closed because of no anaesthetic drugs.
12 They decided to by-pass this health centre and move to Lacor Hospital, about 90 km away. At Lacor
13 Hospital, she received anticonvulsants and antihypertensive. She was taken to the operating room for
14 an emergency caesarean section where a live baby was delivered. The mother was discharged alive
15 but with a stroke. (MNM1).
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22 **Figure 3** Lack of blood. She experienced labour pains for one day and bleeding for 4 hours before
23 going to the Regional Referral Hospital. She had a fresh stillbirth and developed post-partum
24 haemorrhage. The doctor requested three units of blood but there was no blood. She was referred to
25 Lacor Hospital with severe anaemia. At Lacor Hospital there was no blood as well; she died at the
26 admission point. (MD1).
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31 **Figure 4** Multiple referrals across non-functional CEmONC facilities. She had antepartum
32 haemorrhage (APH) and went to the H/C IV but the midwife referred her to the District Hospital for
33 an ultrasound scan; it confirmed complete placenta praevia. A decision to do an emergency
34 caesarean section was made but the operating room did not have electricity prompting referral to the
35 Regional Referral Hospital (RRH). At the RRH she spent six hours looking for money to buy drugs
36 for anaesthesia. After failing to get the money, she was verbally referred to Lacor Hospital but had
37 bled a lot and died of haemorrhagic shock. (MD2).
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44 **Figure 5** Delayed referral and operation. At the health centre III, there was no midwife. The nurse
45 who attended to her did not plot a partograph and kept her for 3 days. The patient requested a referral
46 to H/C IV where she was found to have obstructed labour but there was no doctor to do a caesarean
47 section. She was referred to Lacor Hospital with prolonged obstructed labour and a dead foetus.
48 Emergency caesarean section was done, taken to the intensive care unit (ICU), but got sepsis and
49 died. (MD3).
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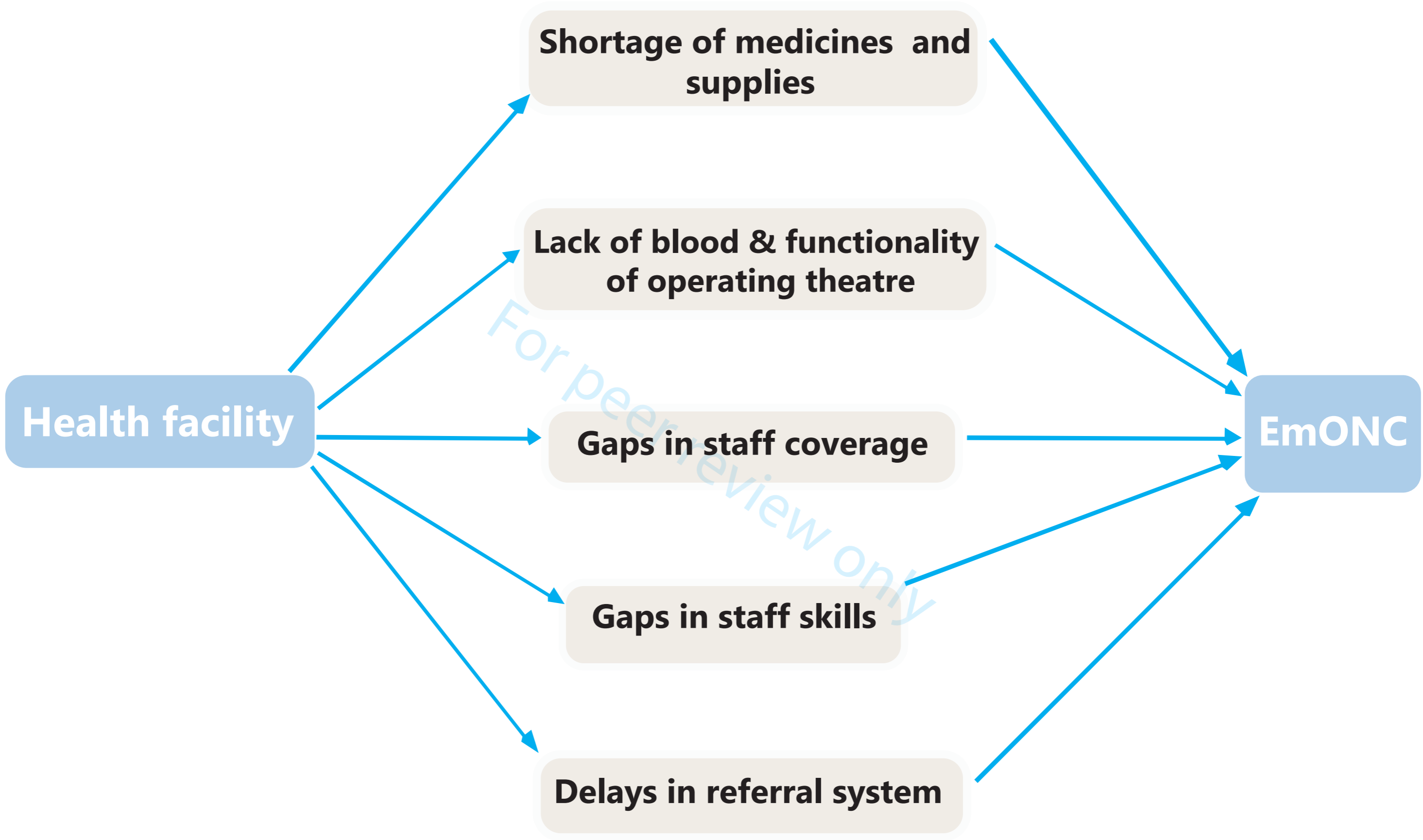
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3 **Figure 6** Non-functional facility and seeking care from the TBA. She had labour pain for 3 hours
4 then went to the TBA because the nearby H/C III had no midwife. The TBA kept her for two days
5 until she failed to deliver. The mother was referred to the district hospital but the doctor was not
6 available over the weekend prompting referral to Lacor Hospital. She had a ruptured uterus and died
7 of septic shock 4 days after the operation. (MD4)
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12 **Figure 7** Non-functional BEmONC facility and seeking care from the religious leader. The woman
13 suddenly collapsed from the garden. She was taken to the H/C III and found the maternity unit
14 closed because there was no midwife. After two episodes of convulsions, the husband gave her raw
15 eggs and inserted a spoon in the mouth to stop her from biting the tongue. The mother-in-law
16 advised that the woman should be taken for prayers at the pastor's place since the condition could be
17 related to evil spirits. She spent six hours with the pastor but continued to fit. When she deteriorated,
18 the husband rushed her to Lacor Hospital where the blood pressure was found to be very high. She
19 was given treatment but died after 30 minutes due to eclampsia. A perimortem operation was done
20 and extracted a live baby. (MD5).
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28 **Figure 8** Skills of the health workers. She experienced labour pain for two days before going to the
29 health centre. The midwife received her and gave her a bed without proper assessment. After three
30 days of active contractions and exhaustion, the attendants requested a referral to Lacor Hospital. She
31 arrived at Lacor hospital with a ruptured uterus and was discharged with a vesicovaginal fistula.
32 (MNM2).
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38 **Figure 9** Back and forth referral due to lack of diagnostics. She had an unsafe abortion then went to
39 H/C IV. The doctor reviewed and started her on antibiotics and intravenous fluids. She was referred
40 to the district hospital for an abdominal ultrasound scan and complete blood count. Unfortunately,
41 these investigations could not be done. She was again referred to a private medical centre for an
42 ultrasound scan that showed massive pus in the abdomen. The operation could not be done because
43 there was no electricity. The family requested a referral to Lacor Hospital where the operation was
44 done; the uterus was removed and discharged alive after 5 days. (MNM3).
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Delays at the facility

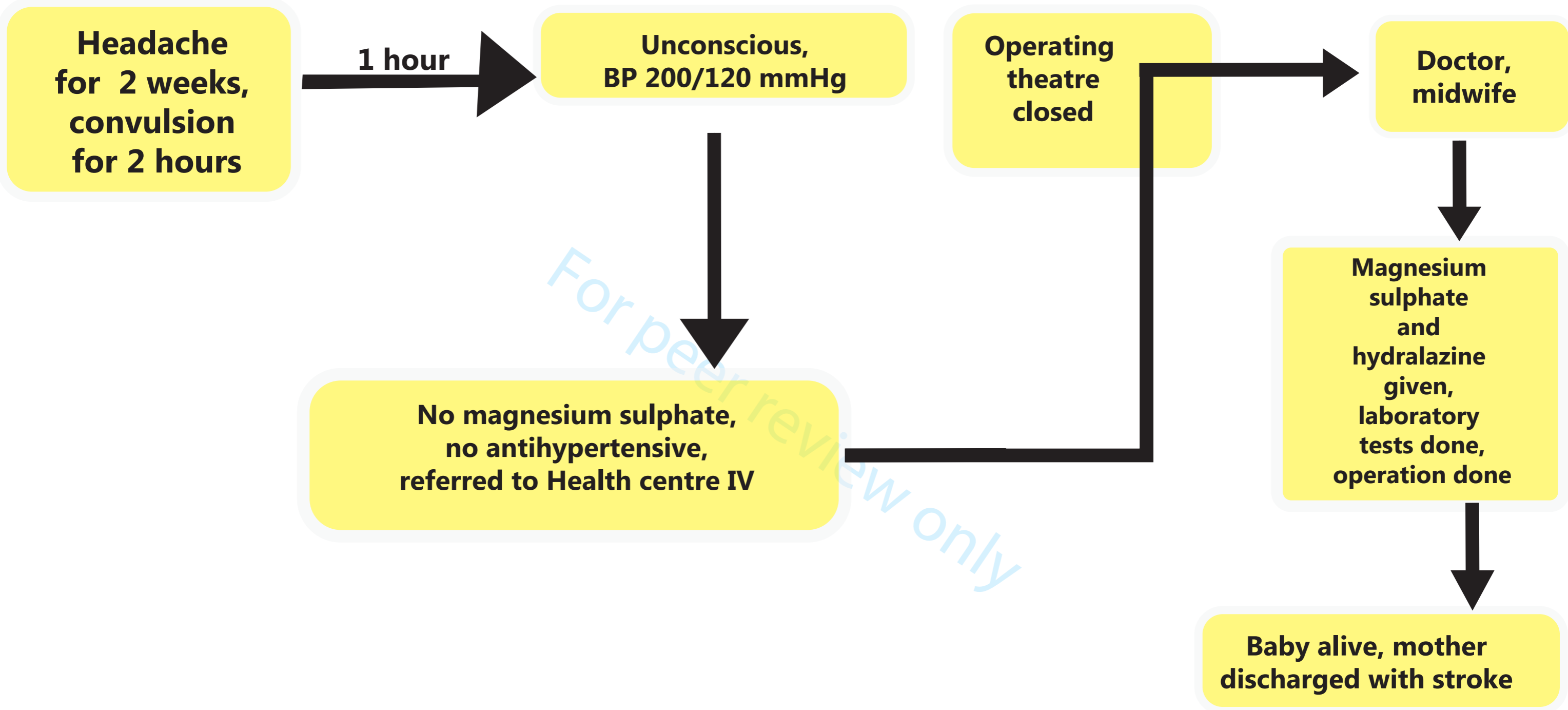
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Woman's home

Health centre II

Health centre IV

Lacor Hospital



Woman's home

Regional Referral Hospital

Lacor Hospital

**Labour for 1 day,
bleeding**

30 minutes

**Doctor, midwife
available**

**Delivered still birth,
developed PPH**

6 hours

**In shock, no blood
available, verbal
referral given.**

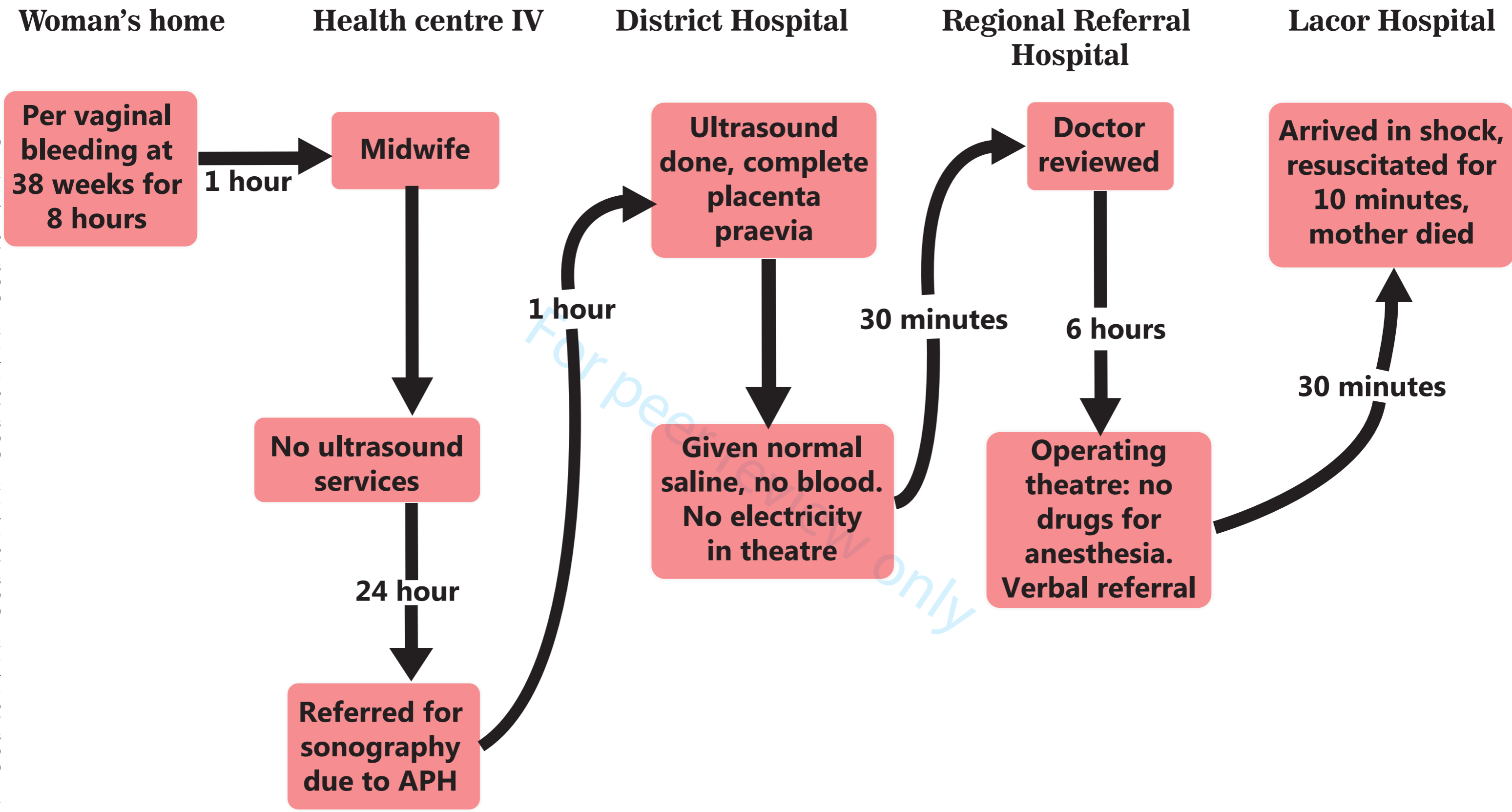
45 minutes

**Doctor
assessed**

**Shock and
severe anemia**

**No blood,
mother died
within 10 minutes**

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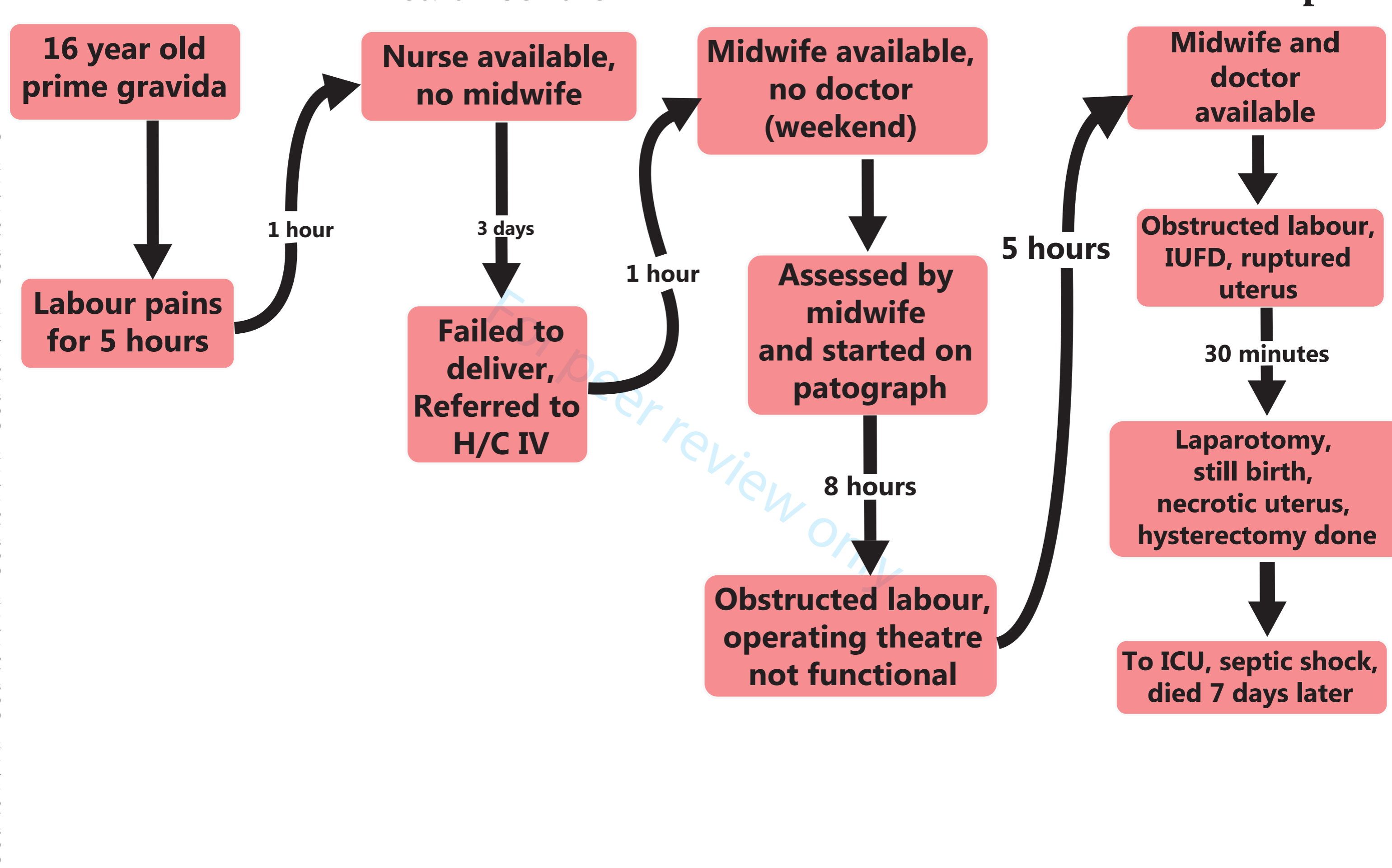


Woman's home

Health centre III

Health centre IV

Lacor Hospital



Woman's home

TBA's house

District Hospital

Lacor Hospital

Labour pain for 3 hours



TBA

2 days



Failed to deliver

1 hour



Nurse



No doctor



Midwife



Obstructed labour

2 hours



Midwife Doctor



Operating theatre, ruptured uterus



ICU, septic shock, mother died

Garden

Health centre III

Pastor's Home

Lacor Hospital

**Woman,
36 weeks
pregnant,
sudden
collapse**

30 min

**Convulsions
2 times.
Maternity
closed**

**Raw eggs,
spoon inserted
in mouth by
husband**

30 min

**6 hours,
convulsions
4 times**

**Unconscious, BP
200/120 mmHg**

**Magnesium
sulphate and
hydralazine given**

**Cardiac arrest,
mother died.**

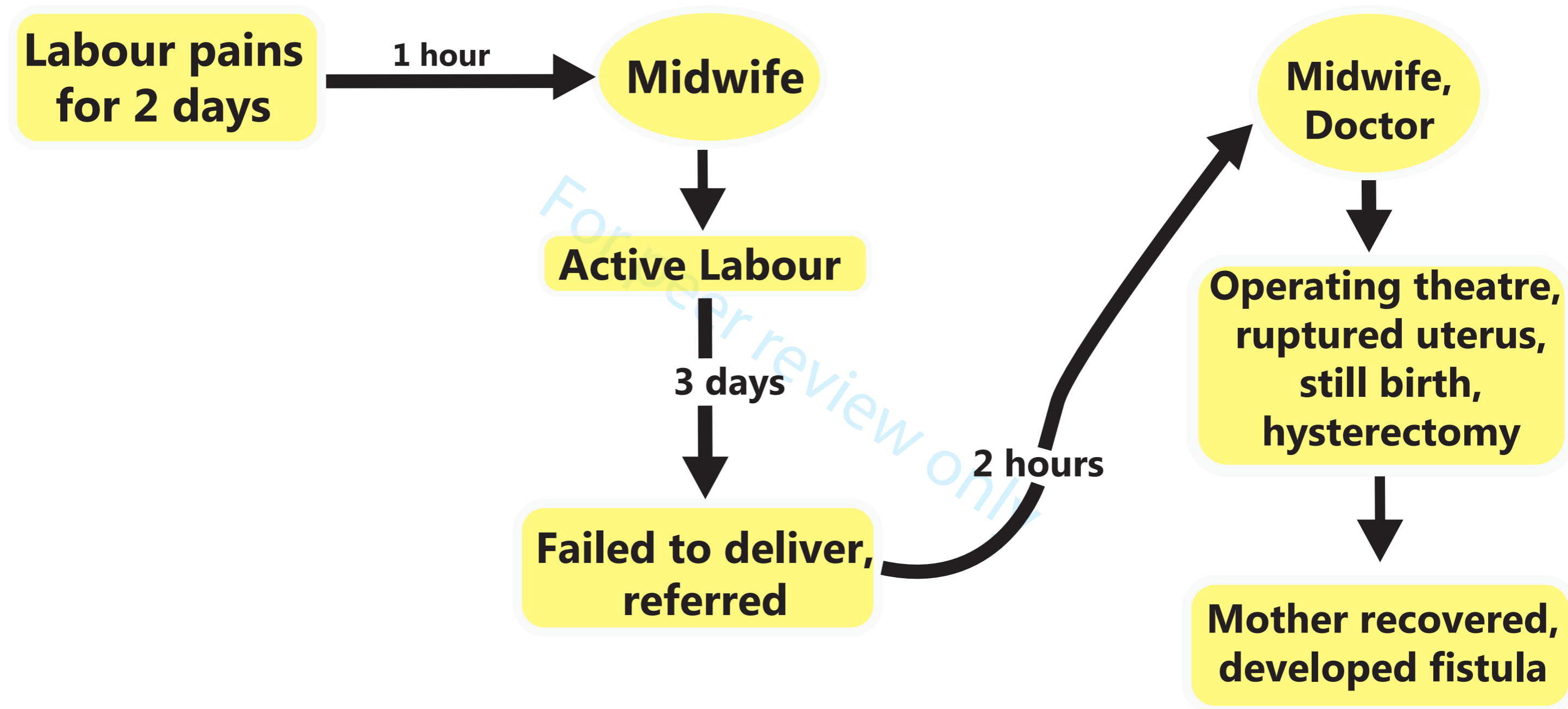
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Woman's home

Health centre III

Lacor Hospital



Woman's home

At Health centre IV

District Hospital

Private Clinic

Lacor Hospital

Induced Abortion

2 weeks

Severe abdominal pain

2 hours

Midwife, Doctor

IV fluids, Antibiotics

6 days

Deterioration of the condition

4 hours

Midwife, No Doctor

No power, referred for ultrasound

Family asked for referral

Doctor called on phone, granted referral

Radiographer

Ultrasound done

4 hours

Midwife, Doctor

Blood transfusion

Operating theatre, hysterectomy

ICU, near-miss, Discharged

For peer review only

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Why women die after reaching the hospital: a qualitative critical incident analysis of the "third delay" in post-conflict northern Uganda.

Guiding questions for the CIT and KI interviews

Introduction

1. The interviewer introduces self and thanks the participant(s) for sparing time for the interview
2. Introduce the study – brief background and objectives of the study. Describe clearly the research and the role of the participants, the commitment involved, any foreseeable risks, and expected benefits.
3. Get verbal consent- ask whether the participant has understood the study and willing to give consent. "Do you need further clarification? If no, do you accept to participate in this study?" If the participant answers "yes", then proceed as below
4. Getting to know the interviewee – name and relationship with the deceased (if applicable).
5. Personal and demographic data
6. Background information about the family

Body

1. The four guiding questions:
 - i. when did (name of the woman or you) start having labour pains or feeling unwell?
 - ii. where did she (or you) go to?
 - iii. how did she (or you) reach there and how long did she (or you) take?
 - iv. what happened on arrival at the facility?
2. Allow the interviewee(s) to speak about the event as much as possible.
3. Return to the beginning of the story and ask follow-up and probing questions in order to make clarifications.

Specific questions

Depending on the specific event and interviewee, ask the following questions:

1. Past obstetric history

2. Previous similar experiences
3. Culture, beliefs and choice of health-seeking behaviours

Additional questions for facility in-charges:

1. What is your evaluation of the quality of emergency obstetrics and new born care (EmONC) services in this facility?
2. What is your evaluation of the ability of the healthcare professionals in this facility to manage obstetric emergencies?
3. What is your evaluation of the obstetric referral system?
4. To what extent are the people in this sub-region satisfied with the maternal healthcare system?

End

1. Any future resolutions and recommendations- what do you think can be done to reduce or prevent delay within the health facilities and, generally, improve maternal and new born outcomes in this facility and the region at large?
2. Revisit the answers of some questions to make clarifications and member checking where necessary.
3. Thank Interviewees for their full participation and help.

Standards for Reporting Qualitative Research (SRQR)

No	Topic	Item	Page & Line #
	Title and abstract		
S1	Title	Concise description of the nature and topic of the study Identifying the study as qualitative or indicating the approach (e.g., ethnography, grounded theory) or data collection methods (e.g., interview, focus group) is recommended	
S2	Abstract	Summary of key elements of the study using the abstract format of the intended publication; typically includes background, purpose, methods, results, and conclusions	
	Introduction		
S3	Problem formulation	Description and significance of the problem/phenomenon studied; review of relevant theory and empirical work; problem statement	
S4	Purpose or research question	Purpose of the study and specific objectives or questions	
	Methods		
S5	Qualitative approach and research paradigm	Qualitative approach (e.g., ethnography, grounded theory, case study, phenomenology, narrative research) and guiding theory if appropriate; identifying the research paradigm (e.g., postpositivist, constructivist/interpretivist) is also recommended; rationale ^b	
S6	Researcher characteristics and reflexivity	Researchers' characteristics that may influence the research, including personal attributes, qualifications/experience, relationship with participants, assumptions, and/or presuppositions; potential or actual interaction between researchers' characteristics and the research questions, approach, methods, results, and/or transferability	
S7	Context	Setting/site and salient contextual factors; rationale ^b	
S8	Sampling strategy	How and why research participants, documents, or events were selected; criteria for deciding when no further sampling was necessary (e.g., sampling saturation); rationale ^b	
S9	Ethical issues pertaining to human subjects	Documentation of approval by an appropriate ethics review board and participant consent, or explanation for lack thereof; other confidentiality and data security issues	
S10	Data collection methods	Types of data collected; details of data collection procedures including (as appropriate) start and stop dates of data collection and analysis, iterative process, triangulation of sources/methods, and modification of procedures in response to evolving study findings; rationale ^b	
S11	Data collection instruments and technologies	Description of instruments (e.g., interview guides, questionnaires) and devices (e.g., audio recorders) used for data collection; if/how the instrument(s) changed over the course of the study	
S12	Units of study	Number and relevant characteristics of participants, documents, or events included in the study; level of participation (could be reported in results)	
S13	Data processing	Methods for processing data prior to and during analysis, including transcription, data entry, data management and security, verification of data integrity, data coding, and anonymization/deidentification of excerpts	
S14	Data analysis	Process by which inferences, themes, etc., were identified and developed, including the researchers involved in data analysis; usually references a specific paradigm or approach; rationale ^b	
S15	Techniques to enhance trustworthiness	Techniques to enhance trustworthiness and credibility of data analysis (e.g., member checking, audit trail, triangulation); rationale ^b	
	Results/findings		
S16	Synthesis and interpretation	Main findings (e.g., interpretations, inferences, and themes); might include development of a theory or model, or integration with prior research or theory	
S17	Links to empirical data	Evidence (e.g., quotes, field notes, text excerpts, photographs) to substantiate analytic findings	

	Discussion		
1			
2	S18	Integration with prior work, implications, transferability, and contribution(s) to the field	Short summary of main findings; explanation of how findings and conclusions connect to, support, elaborate on, or challenge conclusions of earlier scholarship; discussion of scope of application/ generalizability; identification of unique contribution(s) to scholarship in a discipline or field
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6	S19	Limitations	Trustworthiness and limitations of findings
7		Other	
8	S20	Conflicts of interest	Potential sources of influence or perceived influence on study conduct and conclusions; how these were managed
9			
10	S21	Funding	Sources of funding and other support; role of funders in data collection, interpretation, and reporting
11			
12			

O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med* 2014 Sep;89(9):1245-51.

^aThe authors created the SRQR by searching the literature to identify guidelines, reporting standards, and critical appraisal criteria for qualitative research; reviewing the reference lists of retrieved sources; and contacting experts to gain feedback. The SRQR aims to improve the transparency of all aspects of qualitative research by providing clear standards for reporting qualitative research. ^bThe rationale should briefly discuss the justification for choosing that theory, approach, method, or technique rather than other options available, the assumptions and limitations implicit in those choices, and how those choices influence study conclusions and transferability. As appropriate, the rationale for several items might be discussed together.