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Maternal and fetal outcomes of patients referred from primary health-care facilities to a tertiary hospital: A cross-sectional study

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Abstract:

INTRODUCTION: There is insufficient local data on the maternal and fetal morbidity and mortality of cases seen initially at the primary health-care facility (PHCF) and subsequently referred to a tertiary hospital for acute management. This study aimed to determine the maternal and fetal outcomes of such patients using the World Health Organization maternal near miss, mortality, and neonatal mortality rates.

MATERIALS AND METHODS: A cross-sectional study was done that involved obstetric patients beyond 20-week gestation and in the immediate postpartum who were initially managed at the PHCF then referred to a tertiary hospital for management.

RESULTS: There were 485 deliveries (85.5%) with a primary cesarean section rate of 16.6%. One patient underwent exploratory laparotomy for uterine rupture with extraction of a stillborn baby and hysterectomy. Eighteen cases (3.2%) necessitated other forms of surgical interventions including hysterectomy (6), transverse compression suture (3) with bilateral uterine or hypogastric artery ligation, uterine repositioning (1), evacuation of vaginal hematoma (4), balloon pack insertion (2), postpartum curettage (1), and removal of retained suture needle (1). The maternal near-miss rate is 46.7/1000 live births (46.7%). There were three intensive care unit admissions and 5 cases required ventilatory support. The maternal mortality rate is 10.6 maternal deaths per 1000 live births (1.06%). Majority of the babies had good APGAR scores at birth. Twenty-two babies (4.5%) required intensive neonatal management. The neonatal mortality rate is 0.42% or 4.2/1000 live births.

CONCLUSIONS: Almost 40% of referred cases were primigravidas and have preexisting medical problems that should not have been seen at the primary care level but directed to secondary or tertiary center at the outset. It cannot be understated that education of the populace, more training, and monitoring the performance of base health facility workers should be done to prevent maternal and fetal catastrophes.

Keywords:

Fetal outcome, maternal morbidity and mortality, maternal near miss

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Introduction

The leading causes of maternal mortality in developing countries are bleeding, chronic anemia, hypertensive disorders, obstructed labor, unsafe abortions, and infections.^[1] Approximately 42%–82%

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of these maternal deaths are deemed preventable.^[2] To prevent maternal deaths, the complications occurring at home or birthing centers require timely and appropriate referral to referral institutions.^[3,4]

Many theories explain the gaps in referral systems, such as the three delays model, which cites delays in recognition and

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reaching appropriate facilities as one of the main contributors affecting timely management of pregnant women and thus contributing to complications.^[5] Despite this, the present data suggest that the number of complicated deliveries at referral facilities still falls below the anticipated need and that maternity referral systems are under-documented and understudied.^[6,7] Locally, there is insufficient evidence on the maternal morbidity and mortality of complicated obstetric cases initially seen at the primary health-care level and subsequently referred to a tertiary level health institution for acute management.

In the Philippines, the service delivery network was devised by the Department of Health to facilitate the collective management of recurrent issues resulting from the three-tiered health-care system and uncoordinated referral practices among health-care facilities.^[8] Timely recognition and transfer of patients through the three tiers decrease the incidence of preventable maternal, neonatal, and child mortality.^[9]

A maternal death within a facility may be one too many but it remains to be a significant public health problem. It is an indicator of the quality of obstetric care. Furthermore, the number of cases of women who nearly died but survived a complication during pregnancy, childbirth, or postpartum (maternal near miss) is increasingly recognized as useful means to evaluate the quality of obstetric care.^[10]

To date, there are no local studies that have looked into other parameters of maternal and fetal outcomes among referred patients, other than maternal and neonatal mortality. This study assessed the maternal mortality rate and near-miss rate using the World Health Organization (WHO) near-miss criteria.

Objectives

General objective

- To determine the maternal and fetal outcomes of patients referred from primary health-care facilities (PHCFs) to a tertiary care center for immediate obstetric care.

Specific objectives

1. To describe the demographic profile of patients referred from PHCF
2. To determine the maternal outcome of cases managed at a tertiary hospital after referral from PHCF
3. To determine the fetal outcome of cases managed at a tertiary hospital after referral from PHCF
4. To determine the maternal near-miss rate using the WHO near-miss criteria among patients referred from PHCF
5. To determine the maternal mortality and neonatal mortality rate among patients referred from PHCF.

Materials and Methods

This is a cross-sectional study that involved all consecutive obstetric patients initially managed at the PHCF and subsequently transferred to a tertiary hospital for the management including postpartum patients from the period of January 1, 2019, to December 31, 2019. Exclusion criteria were early pregnancy complications (≤ 20 weeks AOG) and postpartum patients who delivered in a secondary or tertiary hospital and sought consult in the referring lying in clinic/health center then later transferred to the tertiary hospital.

Cases were identified from the residents' daily census and their medical charts were retrieved and reviewed. The demographic profile included age, obstetric score, presence of comorbid conditions, age of gestation, site, and number of prenatal care (PNC). The referring facility and reason for referral were also noted. There were no available data regarding the mode of transport and the time interval between referral decision to time seen at the tertiary hospital hence were not included in the study.

Information on the management, manner of delivery, and presence of maternal morbidity or complication were collected. In cases of missing or questionable information in the medical chart, the obstetric resident in charge was interviewed.

Among delivered cases, fetal outcome measures utilized the 1- and 5-min APGAR scores, neonatal intensive care unit (NICU) admission, reason for NICU admission, and cause of neonatal deaths, if any.

Near-miss cases were identified using the WHO near-miss criteria^[11] [Appendixes A and B]. Data on organ dysfunction, intensive care unit (ICU) admission, blood transfusion, intubation, and surgical intervention other than delivery were gathered. Maternal near-miss rate was computed. Maternal and neonatal mortality rates were also computed and the causes were determined from the chart review. All these information were recorded in a structured data abstraction form [Appendix C].

Quantitative variables such as age, gravidity, parity, and age of gestation were summarized using mean, median, and standard deviation. Frequency and percentage distribution were used to summarize qualitative data such as comorbidities, reasons for referral, and mode of delivery. Pie and bar charts were also generated. The study protocol was reviewed and approved by the Technical Review Board and Institutional Ethics Review Board.

Results

Demographic profile

Out of a total of 9664 obstetric admissions, 567 (5.9%) were cases from PHCF. The mean age is 26.6 (± 5.4) years. The age range is 15–45 years. Majority of these cases (63%) were in the 21–30-year age group.

A third of the cases (178) were primigravida, followed by secundigravida (162). These two low gravidity groups comprised 59.9% of total cases. The high-risk gravidity group ($>G5$) comprised only 5.3% of cases.

Forty-two referred cases (7.4%) have preexisting medical complications that included hypertension, diabetes mellitus, thyroid disorder, hepatitis B infection, anemia, condyloma acuminata, cardiovascular disease, asthma, suspected antiphospholipid antibody syndrome, neurofibromatosis, syphilis, and Bell's palsy. Among these comorbid problems, hypertension was the most common followed by diabetes mellitus [Table 1].

Of the 567 referred cases, 90% (558) had some form of PNC. Half of cases (287) had five or more PNC visits. Over 20% (127) had 4 PNC visits and a quarter (144) had 3 or less PNC visits. There is still a small number (9) who went through pregnancy without PNC.

Primary health-care facilities

Sixty percent of referred cases (335) had their PNC visit at the surrounding PHCFs. A quarter of cases (146) alone had their PNC visits from the PHCF in PHCF1, an area north of the tertiary hospital. When this number is combined with PNC visits from the PHCF2 and PHCF3, these areas account for a third (185) of all PHCF PNC visits.

Eighty-one percent (81%) of all referring facilities are within the city while the remaining 19% came from other cities and nearby provinces.

Table 1: Frequency distribution of cases by preexisting comorbidities

Preexisting comorbidity	Frequency, n (%)
Hypertension	11 (26.2)
Diabetes	7 (16.7)
Thyroid disorder	6 (14.3)
Hepatitis B infection	4 (9.6)
Anemia	3 (7.1)
Condyloma	3 (7.1)
Cardiovascular	2 (4.8)
Asthma	2 (4.8)
Suspected APAS	1 (2.4)
Neurofibromatosis	1 (2.4)
Syphilis	1 (2.4)
Bell's palsy	1 (2.4)
Total (n)	42 (100)

APAS: Antiphospholipid antibody syndrome

Table 2 shows the frequency distribution of cases according to reasons for transfer. The most common reasons for transfer were dystocia, which accounted for 27% followed closely by hypertension (24.8%). Twenty two (55%) of these indications can be detected before PHCF admission such as teenage pregnancy, grand multiparity, postdatism, preterm labor, prelabor rupture of membranes, preterm prelabor rupture of membranes, placenta previa, malpresentation, intrauterine fetal demise, fetal macrosomia, previous pelvic surgery (scarred uterus, oophorocystectomy), medical comorbidities (anemia, hypertension, diabetes mellitus, thyroid, and cardiovascular diseases, Bell's palsy), and infections (acute gastroenteritis, hepatitis, syphilis, condyloma acuminata).

A subgroup of 76 (13.4%) postpartum women transferred to the tertiary hospital had significant morbidities that included postpartum hemorrhage, prolonged third stage, hematoma, uterine rupture, uterine inversion, foreign body in the perineum (retained needle), puerperal sepsis, anemia, and hypertension.

There were six undelivered patients (1.1%) managed conservatively and were subsequently discharged from the hospital. However, these undelivered cases had no record of readmission and were lost to follow-up.

Maternal outcome

Mode of delivery

There were 485 deliveries (85.5%) out of the 567 referred cases. Two-thirds of cases underwent spontaneous vaginal delivery. Primary cesarean section (CS) was done on 94 referred cases with a primary CS rate of 16.6%. Outlet forceps extraction was performed in 35 cases (6.1%). One patient underwent emergency exploratory laparotomy for uterine rupture followed by extraction of a stillborn baby and hysterectomy in a secundigravida. The mother survived. The case was a referral from a PHCF in a nearby city. Table 3 shows the frequency distribution of cases by mode of delivery.

Other obstetric interventions

Of the 567 referrals, 18 cases (3.2%) necessitated other forms of major and minor surgical interventions although not all were qualified as maternal near miss [Table 4]. There were six hysterectomies: four were done for uterine atony and one was for the above-mentioned uterine rupture. Another hysterectomy with cystorrhaphy was done for uterine rupture following outlet forceps extraction. Three cases underwent transverse compression suture of the uterus for atony subsequent to bilateral uterine artery ligation (2) and bilateral hypogastric artery ligation (1).

Nine minor procedures were performed and are as follows: vaginal uterine repositioning for inversion (1), evacuation of vaginal hematoma and ligation

Table 2: Distribution of cases according to reason for referral

Reasons for transfer from PHCF to EAMC	Frequency, n (%)
Dystocia	153 (27)
Protracted labor	116 (20.5)
Prolonged second stage of labor	37 (6.5)
Hypertension	140 (24.7)
Postpartum hemorrhage	38 (6.7)
Prelabor rupture of membranes	35 (6.1)
Malpresentation	32 (5.6)
Nonreassuring fetal status	28 (4.9)
Decelerations on CTG	22 (3.9)
Minimal variability on CTG	1 (0.17)
Fetal tachycardia	3 (0.5)
Fetal bradycardia	2 (0.3)
Intrauterine fetal demise	16 (2.8)
Diabetes mellitus	14 (2.5)
Preterm labor	13 (2.3)
Prolonged third stage of labor	13 (2.3)
Stained amniotic fluid	11 (1.9)
Fetal macrosomia	7 (1.2)
Anemia	6 (1.1)
Postdatism	6 (1.1)
Placenta previa	6 (1.1)
Hematoma	6 (1.1)
Maternal tachycardia	4 (0.7)
Teenage pregnancy	4 (0.7)
Oligohydramnios	4 (0.7)
Grand multiparity	3 (0.5)
Thyroid disease	3 (0.5)
Acute gastroenteritis	2 (0.4)
Cardiac disease	2 (0.4)
Hepatitis infection	2 (0.4)
Condyloma acuminata	2 (0.4)
Scarred uterus	2 (0.4)
Intraamniotic infection	2 (0.4)
Preterm prelabor rupture of membranes	1 (0.2)
Uterine inversion	1 (0.2)
Fever	1 (0.2)
Cord prolapse	1 (0.2)
Hypokalemia	1 (0.2)
Syphilis	1 (0.2)
Bell's palsy	1 (0.2)
Bloody amniotic fluid	1 (0.2)
Thinned out lower uterine segment	1 (0.2)
Uterine rupture	1 (0.2)
Retained needle during episiorrhaphy	1 (0.2)
Previous oophorocystectomy	1 (0.2)
Puerperal sepsis	1 (0.2)
Total	567 (100)

PHCF: Primary health-care facility, CTG: Cardiotocography, EAMC: East avenue medical center

bleeders (4), insertion of balloon pack into the uterine cavity for postpartum hemorrhage (2), postpartum curettage for retained secundines (1), and one case of perineal exploration followed by removal of foreign body (retained suture needle).

Maternal near-miss events

There were 22 maternal near-miss cases who satisfied the criteria set by the WHO. The maternal near-miss rate is 46.7/1000 live births (46.7%). The following WHO near-miss cases were seen: shock or use of continuous vasoactive drugs, cardiac arrest or cardiopulmonary resuscitation, intubation and ventilation unrelated to anesthesia, oliguria unresponsive to fluids or diuretics, coagulation/hematological dysfunction as evidenced by failure to form clots or massive transfusion of blood of red cells ≥ 5 units, prolonged unconsciousness lasting ≥ 12 h/coma, and uterine hemorrhage leading to hysterectomy [Table 5]. Three cases required admission to the ICU and 5 cases required ventilatory support.

Each of the criterion in the WHO near-miss criteria is not mutually exclusive so the frequency count used events, not cases, as the unit. The most common near-miss events were directly related to excessive blood loss: massive blood transfusion, shock, and uterine hemorrhage accounting for 75% of total near-miss events.

Maternal mortality

Of the 567 referred cases, 562 (99.1%) were discharged alive. There were 5 deaths giving a computed maternal mortality rate of 10.6 maternal deaths per 1000 live births (1.06%). Three died from hypovolemic shock secondary to postpartum hemorrhage (60%), one from myocardial infarction (20%), and one from eclampsia with congestive heart failure and acute respiratory failure (20%).

Fetal outcome

There were 485 deliveries with the following fetal outcomes: majority (449) were well accounting for 92.6% of all babies delivered. There were 22 babies (4.5%) who required intensive neonatal management. Among the sick babies, 18 required neonatal ICU (NICU) admissions and 4 intermediate care unit (IMCU) admissions. There is one delivery room death from a transfer due to prolonged second stage of labor. There were 13 stillbirths. Figure 1 shows the distribution of fetal outcomes.

For the 472 live births, the mean 1st and 5th min APGAR scores are 7.8 (± 0.8) and 8.9 (± 0.6), respectively. Majority of the babies had good APGAR scores of ≥ 7 for the 1st (452, 95.8%) and 5th min (467, 98.9%), respectively. Twenty babies required resuscitation for having APGAR scores of < 7 at 1 min. Five babies remained asphyxiated with APGAR scores still < 7 at 5 min. Of these 5 babies, one baby had zero APGAR subsequently pronounced as a delivery room death.

There were 22 babies admitted to the NICU or IMCU. Majority of NICU/IMCU admissions were for infection,

ranging from sepsis to pneumonia. One baby had congenital syphilis with pneumonia. Other causes were prematurity alone, hypoxic-ischemic encephalopathy, and facial hematoma.

Twenty of these babies were discharged from hospital alive except two. The causes of these two neonatal deaths were respiratory distress syndrome and hypoxic-ischemic encephalopathy Stage III, both complicated by sepsis. The neonatal mortality rate is 0.42% or 4.2/1000 live births.

Table 3: Frequency distribution of cases by mode of delivery

Mode of delivery	Frequency, n (%)
Spontaneous vaginal delivery	328 (67.6)
CS	116 (23.9)
Primary CS	94
Repeat CS	22
Outlet forceps extraction	35 (7.2)
Partial breech extraction	5 (1.0)
Exploratory laparotomy for uterine rupture, extraction of stillborn fetus	1 (0.2)
Total	485 (100)

CS: Cesarean section

Table 4: Major and minor surgical interventions

Surgical interventions	Frequency, n (%)
Major procedures	
Hysterectomy	6 (0.7)
Hysterectomy alone	4
Hysterectomy+cystorrhaphy	1
Hysterectomy+extraction of stillborn	1
Transverse compression suture of the uterus	3 (0.5)
+ Bilateral uterine artery ligation	2
+ Bilateral hypogastric artery ligation	1
Minor procedures	
Vaginal uterine repositioning	1 (0.2)
Evacuation of vaginal hematoma	4 (0.7)
Balloon packing of the uterine cavity	2 (0.4)
Postpartum curettage	1 (0.2)
Perineal exploration/removal of foreign body (suture needle)	1 (0.2)
Total	18 (3.2)

Discussion

The proportion of cases referred from the PHCFs to the tertiary hospital within the 1-year study period was 5.9% of the total obstetric admissions compared to studies where the proportions of referred cases to a tertiary care institution were between 15% and 24%.^[12,13] Other studies have shown higher percentages because referrals included those from private clinics, secondary and tertiary health-care facilities. This is the first study of such nature at the tertiary hospital and it is unknown if there are significant variations across time. The health institution is also located in an urban area where other government tertiary hospitals are found.

A significant number of the referred cases was primigravida (31.4%) compared to other studies where half of cases were primigravida.^[12,14] Ideally, no proportion should exist because the current local recommendation is for the first pregnancy deliveries to occur in at least a secondary hospital setting.

The mean number of PNC visits among referred cases is 5 and over 70% of them had 5 or more. While these numbers are a fair indicator of compliance to the Philippines' maternal care program that recommends at least four PNC visits during pregnancy, a significant number of cases (25%) had only one to three PNC visits and over 1% had none.

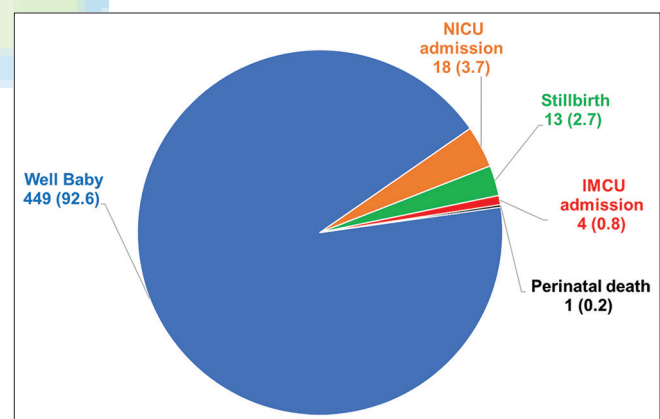


Figure 1: Diagram of fetal outcome, n = 485 (%)

Table 5: Maternal near-miss events by the WHO criteria

Criteria	Frequency, n (%)
Coagulation/hematological dysfunction (failure to form clots, massive transfusion of blood or red cells (≥ 5 units))	14 (31.8)
Shock or use of continuous vasoactive drugs	13 (29.5)
Uterine hemorrhage leading to hysterectomy	6 (13.6)
Intubation and ventilation unrelated to anesthesia	5 (11.4)
Oliguria unresponsive to fluids or diuretics	1 (2.3)
Prolonged unconsciousness (lasting ≥ 12 h) or coma	2 (4.5)
Cardiac arrest, cardiopulmonary resuscitation	3 (6.8)
Total events	44 (100)

*Each criterion is not mutually exclusive across cases so the frequency refers to the number of events and not to cases

Women with high-risk conditions such as preexisting diabetes mellitus are more likely to develop adverse pregnancy outcomes.^[15] A study among rural public health-care providers mentioned inability to manage childbirth in women with high-risk conditions and complications. In the absence of efficient referral systems and communication, antenatal care in advanced centers where they should deliver is recommended.^[16] Despite the local recommendation of PNC in the hospital setting for high-risk pregnancies, there were 42 referred cases (7.1%) with known comorbidities yet initially seen in a PHCF.

The most common reasons for transfer to the tertiary hospital are dystocia or difficult labor (27%) and hypertension (24.8%) consistent with other published studies.^[17,18] It cannot be overstated that hypertensive disorders in pregnancy are increasing and are associated with maternal mortality worldwide. The diagnosis and acute management of severe hypertension are central to reducing maternal mortality.^[19,20] Birthing centers and lying-in clinics are not equipped for emergent abdominal delivery. A primigravida by virtue of her untested pelvis and pregnant women with comorbidities can encounter intrapartum complications that may warrant emergency CS hence should be admitted directly to a suitable higher level of care.

The primary CS rate in the study group is 16.6%, which is significantly higher than the hospital's overall primary CS rate of 12.1%. Studies have shown that referral status substantially increased the CS rate to above 50% among formally referred cases.^[21,22] This is clearly due to the fact that the referring PHCF is not equipped for abdominal delivery to address the complicated cases initially admitted to them.

This study revealed a maternal near-miss rate of 46.7/1000 live births, higher than most reports with a range from 18 to 32.9/1000 live births.^[23,24] Near-miss cases also impact the limited capacity of the critical care unit in an institution. This study revealed three cases that required ICU admission and five cases that required ventilatory support.

Far worse than contributing to the burden of near misses, a study found that referred near-miss cases contributed to over 85% of maternal deaths.^[25] The maternal mortality rate of these referred cases is 10.6/1000 live births (1.06%). In 2019, there were 19 maternal deaths at the tertiary hospital, including five from the referred contributing 26% of total maternal deaths.

The leading cause of maternal mortality in the study is postpartum hemorrhage, a preventable risk factor for death if managed appropriately and timely. The two other

causes are complications of hypertension (eclampsia) and cardiac disease. Unfortunately, even with the advancement of medicine and technology, these three disorders have been the scourge of pregnant women across developing countries.^[26,27]

Almost all babies (92.6%) were well with 22 (4.5%) of babies needing more intensive management. Five babies (1%) were born severely asphyxiated and one eventually succumbed. The stillbirths accounted for 2.7%. Other reports were bleaker with higher proportion of asphyxiated babies (9.8%), NICU admissions (10%–15%), and stillbirths.^[13,25]

The neonatal mortality rate for this group is 1.06% lower than the reported 4%–5%.^[13] The most common cause was sepsis.

Conclusions

This is the first local study that looked into the maternal and fetal outcome of referred cases from PHCFs to a government tertiary care hospital. In addition, the study employed the WHO near-miss criteria to evaluate the quality of obstetric care from PHCF and from the referral center where the cases were transferred.

Almost 40% of referred cases (primigravidas and pregnant women with preexisting medical problems) should not have been seen at the primary care level but directed to secondary or tertiary care center where these cases can be appropriately managed. Needless to say, education of the populace, and more training and monitoring the performance of the base health facility workers should be done to prevent maternal and fetal catastrophes.

Limitation

This is a descriptive study that employed secondary data. Therefore, some important information regarding the referral process were not recorded including time interval from referral decision to arrival at the tertiary hospital, duration of stay at the PHCF, initial management at the referring facility, mode of transport to the tertiary hospital, accompanying person at the time of patient conduction, presence of medical abstract or written endorsement from PHCF, prior arrangements from PHCF to the tertiary hospital, and vital signs and condition of mother/baby dyad at the time of transfer.

Finally, this study was done in the urban setting where majority of cases that were transferred to the tertiary hospital came from surrounding and nearby PHCF. The results of the study may not apply to settings that are not similar to that of the study.

Recommendations

Proper documentation of the referral process is essential to evaluate the quality of care provided in the referring facility as well as the referral hospital. Prospective evaluation of referrals from all levels of facilities that provide obstetric care may also be explored.

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Conflicts of interest

There are no conflicts of interest.

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