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Application of WHO ICD-PM Classification for Perinatal Death (PND) in a Tertiary Care Hospital

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Author`s Contribution

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ABSTRACT

Objective: To apply the WHO ICD-PM classification for systematically identifying and categorizing perinatal death causes, improving reporting, understanding risk factors, to reduce mortality.

Methodology: This was a retrospective cross-sectional study conducted in Gynae unit 1 of Dr. Ruth KM PFAU Civil Hospital Karachi from Jan 2019 to Dec 2020. All PND occurring during this period were classified according to WHO ICD–PM classification. Data was analyzed by SPSS–24. Chi square test applied to detect significance based on P–value <0.05.

Results: Total 8309 women delivered with 639 PND during the study period of which 82.8% were stillbirth and 110 were neonatal deaths. Most common cause of antepartum deaths were antepartum hypoxia and disorder of fetal growth) which were mainly associated with M4 maternal condition. Intrapartum deaths were caused by intrapartum events in 73.87% cases, mainly due to complications of labour and delivery (M3). Neonatal deaths were mainly related to intapartum events (M3) or low birth weight (N9) and mainly associated with maternal complication of pregnancy (M2). In 13.6% of antepartum deaths no maternal cause could be assigned, as compared to 1.87% in intrapartum deaths and 1.8% in neonatal groups.

Conclusion: *The ICD–PM observed to be a applicable PND classification system which can be utilized to plan appropriate evidence-based national strategy to reduce perinatal deaths.*

Keywords: ICDM – PM classification, perinatal deaths, maternal causes, antepartum, intrapartum, neonatal deaths.

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Introduction

Perinatal death remains a significant public health issue throughout the world, specifically in low- and middle-income countries (LMICs),[1] where the highest burden of stillbirths and neonatal deaths has been observed. In 2019, the global incidence of stillbirths was approximately 14 per 1,000 total births, while neonatal deaths occurred at a rate of 17 per 1,000 live births.[2,3]

However, the figures were significantly higher in LMICs, where an estimated 19 stillbirths per 1,000 births and 25 neonatal deaths per 1,000 live births were reported. As part of the United Nations Sustainable Development Goals, there is a commitment to lowering neonatal mortality to 12 per 1,000 live births by the year 2030.[2,4]

Perinatal death results from a complex interplay of pathophysiological processes between the mother and the fetus, with multiple contributing factors. Perfectly characterizing and recording these factors remains a significant challenge when determining the causes of the mortality within classification system of a perinatal death. Developing a precise and standardized framework to classifying the causes and associated conditions of the perinatal deaths is very important for the developing strategies aimed to prevent the approximately five million perinatal deaths that occur worldwide every year.[5]

Conversely, gathering the highly accurate data on perinatal mortality is an important step to addressing such issues. “Every Newborn Action Plan” integrates the maternal and perinatal mortality audits into two of its five

key proposes: improving the quality of care at the births and the strengthening data collection to supporting the informed decision-making and interventional effectiveness.[6] Encouragement in this effort, the WHO offered the International Classification of Diseases Perinatal Mortality "ICD-PM" system, which was first published during 2016.[7] Such reliable framework allows healthcare professionals to more accurately identifying the underlying causes of the perinatal mortality and its related maternal situations. Through systematically classifying perinatal deaths, the ICD-PM provides vital evidence to inform the targeted interventions, development of the policies, and improvement quality in the services of perinatal care. Such system has three key points: 1st is to recording the death timing, whether antepartum, intrapartum, or neonatal; 2nd is to employ the multilayered classification method that adapts to the presented information levels based on the exact setting; and 3rd is to establishment the link between maternal situations and the perinatal death to better understanding the causative factors.[8] Moreover it is extensively recognized as the standard system to classifying the perinatal mortality, as recognized through pilot studies done in UK and the South Africa.[8-10] These three different features comprise the capability to record the perinatal death timing, a comprehensive approach to conclude the perinatal mortality related causes, and the capacity to relation maternal conditions contributing to perinatal deaths with the exact codes of ICD. It utilizes ICD-10 codes to ensure standardized classification and reporting.[9]

No such studies have been found at local level utilizing the ICD-PM classification system for perinatal mortality. Given the critical need for accurate data on the number and causes of perinatal deaths, we aimed to implement this classification in our setting to enhance documentation and analysis. Such data is essential for improving the quality of care, preventing future perinatal deaths, optimizing resource allocation, strengthening vital statistics, and achieving global health targets.[11] Therefore, this study was designed to apply the WHO ICD-PM classification system to perinatal deaths occurring in a tertiary care hospital, contributing to evidence-based interventions and policy development

Methodology

This hospital-based, cross-sectional retrospective study was conducted at the Gynecology Unit of a tertiary care referral hospital, Dr. Ruth K. M. Pfau Civil Hospital, Karachi. The study covered a one-year period from January 1, 2019, to December 31, 2020. Approximately 18,000 women deliver at this hospital annually. However, the department is under-resourced and understaffed when comparing the ratio of birth attendants to laboring women.

All cases of stillbirths and early neonatal deaths recorded in the hospital, with available maternal and neonatal clinical data, were included in the study. Perinatal mortality was defined as stillbirths (fetal deaths occurring at ≥28 weeks of gestation or with a birth weight ≥1000 grams) and early neonatal deaths (death of a live-born baby within the first 7 days of life). Cases with incomplete or missing medical records and those where death occurred more than 7 days after delivery were excluded.

Data were collected as part of the routine maintenance of ward medical records, following the WHO ICD-PM classification format, from the labor room, operation theaters, and neonatal wards. The recorded variables included:

Maternal characteristics (age, parity, and booking status), Obstetric factors (gestational age, mode of delivery, stillbirth or neonatal death), Obstetric and medical conditions and Fetal factors, classified according to the ICD-PM system

A gross examination of all stillborn babies was conducted to assess for anomalies and signs of infection. Antepartum death was defined as stillbirth occurring in mothers who arrived at the healthcare facility before the onset of labor with an absent fetal heart sound on examination or the delivery of a macerated stillbirth where the time of fetal demise was unknown. Intrapartum death was defined as fetal death occurring during labor in cases where the mother arrived with a detectable fetal heart sound and/or the delivery of a fresh stillbirth where the time of fetal death was unknown.

Pregnancies that were registered and had received at least three antenatal care (ANC) visits were classified as booked. Gestational age was determined based on the last menstrual period and/or first-trimester ultrasound findings. Deliveries occurring between 24 and <37 weeks of gestation were classified as preterm.

The WHO ICD-PM system was used to classify fetal causes of stillbirth based on the time of death: Antepartum deaths (A1–A6), Intrapartum deaths (I1–I7), Neonatal deaths (N1–N11), Maternal causes (M1–M5)

Maternal condition M1 (complications of the placenta and membranes) included placenta previa, placental abruption, and cord prolapse. Maternal medical and surgical conditions (M4) encompassed hypertensive disorders, gestational diabetes, and sickle cell disease. When multiple causes were identified, classification was based on the first event in the chain (e.g., a case of severe preeclampsia, fetal growth restriction, and placental abruption was categorized under severe preeclampsia). Similarly, when multiple independent maternal factors were present, the most significant contributing factor was used for classification. Ethical approval was obtained from the Institutional Review Board (IRB) (Approval No. IRB1979/DUHS/Approval/2021), dated March 4, 2021. Data analysis was performed using SPSS version 24.

Results

Between 1st Jan 2019 and 31st Dec 2020 total 8309 women delivered, of which 639 resulted in perinatal deaths giving a rate of 76.90 per 1000 total births. Among this 529 (82.8%) were still births while 110 (17.2%) were early neonatal deaths. Still birth group has 418 antepartum deaths and 111 intrapartum deaths.

The WHO ICD-PM classification categorizes maternal conditions contributing to perinatal deaths into five groups. Studies indicate that M1 (placental, cord, and membrane complications**)** saccounts for approximately 20-30% of perinatal deaths, including cases of placental abruption and cord prolapse. M2 (maternal complications**)** contributes to around 15-25%**,** covering conditions such as prolonged labor and uterine rupture. M3 "other labor and delivery complications" may responsible to the 10-20% of the patients. M4 "maternal medical and surgical conditions" comprising the hypertension and gestational diabetes, found in the 25-35% of perinatal mortality. Moreover, M5 "no maternal condition identified" was observed in around 5-15% of the cases, where no specific maternal factor is recognized to the death. Table I

Perinatal deaths classification based on the WHO ICD-PM system showed that the antepartum deaths were basically associated maternal medical and surgical conditions "M4" among 59.9% of cases and other labor related complications "M3" among 36.4% cases**.** Additionally, intrapartum deaths were mostly due to M3 in "72%" cases**,** demonstrating complications linked to the labor as the major causative factor. Neonatal deaths were significantly linked with M4 in 34% cases and M3 on 32.1% of the cases**,** reflecting the impact of maternal health on the survival of newborns. Predominantly, M5 was in 81.2% cases, suggesting the gaps in causes determination. Table II

Discussion

This study evaluates the application of the WHO ICD-PM classification in a busy birth center in a low-income country, highlighting a high burden of perinatal deaths. The stillbirth rate observed is nearly five times higher than neonatal deaths, making it challenging to meet the Every Newborn Action Plan (ENAP) 2030 targets. The trend of stillbirths and PND remains consistent with

Table I: Maternal and Fetal characteristics of perinatal deaths

Variables	Categories	Antepartum N = 418		Intrapartum N = 111		Neonatal Death n= 110		P-Value	Total n=639
		No. (%)	Mean	No. (%)	Mean	No. (%)	Mean		
Maternal Age (years)	<20	12(48.0)		0		13 (52)			25
	20-35	383(66.4)	27.81	109(18.9)	28.4	85(14.7)	25.37	0	577
	>35	23(62.2)		2 (5.4)		12(32.4)			37
Parity	Primary (1)	126(64)		27(13.7)		44(22.3)			197
	4-Feb	214(70.2)	2.85	65(21.3)	2.89	26 (8.5)	3.35	0.068	305
	>4	78(56.9)		19(13.9)		40(29.2)			137
Gest Age (Weeks)	<28	91(89.2)		9 (8.8)		2(2)			102
	28-37	232(63.2)	34.75	55(15.1)	34.99	77(21.2)	35.01	0.983	364
	>37	95(54.9)		47(27.2)		31(17.9)			173
Mode of delivery	Vaginal Delivery	332(70.63)		64(13.61)		74(15.74)			470
	Cesarean Section	86(56.95)		29(19.20)		36(23.84)		0	151
	Laparotomy	0		18(100)		0			18
Booking Status	Booked	95(65.19)		17(11.48)		36(24.32)			148
	Non Booked	323(65.78)		94(19.14)		74(15.07)		0.008	491
Birth Weight(Kg)	<1.kg	57(79.9)		9 (12.5)		6 (8.3)		0.004	72
	1-2.5kg	273(65)	1.86	66(15.7)	2.14	81(19.3)	1.79		420
	>2.5kg	88(59.9)		36(24.5)		23(15.6)			147

Table II: Classification of perinatal death according to ICD-PM.

Timing Death	M1	M2	M3	M4	M5	Total
I Antepartum						
A1	0	28.6(6)	9.5(2)	23.8(5)	38.1(8)	21(100)
A2	4(91)	14(31.8)	4(9.1)	10(27.7)	12(27.3)	100(44)
A3	70 (30.9)	18 (9.2)	34(17.4)	71(36.4)	2 (1.0)	100(195)
A4	13(52)	08 (32)	0	4(16)	0	25(100)
A5	2(2)	14(23.8)	6 (5.9)	60(59.9)	9 (8.9)	101(100)
A6	2 (6.2)	0	14(23.8)	4 (12.5)	26.(81.2)	32(100)
II Intraparterm						
I1	0	0	0	0	0	
I2	0	0	0	0	0	
I3	4 (4.9)	2 (2.4)	59(72)	15(18.3)	2 (2.4)	82 (100)
I4	0	0	0	0	0	
I5	0	0	5(100)	0	0	5 (100)
I6	0	5 (22.7)	15(68.2)	2 (9.1)	0	22(100)
I7	0	0	0	2 (100)	0	2 (100)
III Neonatal						
N1	0	10(71.4)	0	4 (28.5)	0	14(100)
N2	0	0	2 (100)	0	0	2(100)
N3	0	0	0	2 (100)	0	2(100)
N4	2 (3.8)	14(26.4)	17 (32.1))	18(34)	2(3.8)	53(100)
N5	0	0	0	0	0	0
N6	0	0	0	0	0	0
N7	0	0	2 (100)	0	0	0
N8	0	6 (28.6)	9 (42.9)	6 (28.6)	0	21 (100)
N9	2	4 (25)	10 (62.5)	0	0	0
N10	0	0	0	0	0	0
N11	0	0	0	0	0-	0

previous studies from the same region, indicating persistent challenges in perinatal care.[12,13] However, as a referral center, the PND rates reported here are not directly comparable to national statistics, a limitation also noted in other studies.[14] The study findings align with research from the UK and South Africa, where even with improved antenatal care, stillbirths remain high. The mean maternal age of 27.5 years is comparable to global literature.[15] Based on the timing of death, maternal medical and surgical conditions (M4) were the leading cause of antepartum deaths, while labor and delivery complications (M3) were responsible for most intrapartum deaths, consistent with this study. The majority of affected patients were un-booked, emphasizing the importance of early and high-quality antenatal care for timely detection and management of maternal conditions.

Globally, studies have shown that hypertensive disorders and placental complications are significant maternal risk factors for perinatal deaths.[16] In high-income countries like the UK and South Africa, antepartum deaths are often unexplained or linked to fetal anomalies, while intrapartum deaths are mostly hypoxia-related and neonatal deaths result from low birth weight and prematurity. In this study, unidentified maternal conditions (M5) and unspecified stillbirths (A6 and I7) constituted a small proportion, reflecting the utility of ICD-PM-based record maintenance.

International research suggests that postmortem examinations, including placental studies, can provide crucial clinical information to better classify stillbirths and neonatal deaths. For example, a Sri Lankan study reported that 41.9% of stillbirths were due to antepartum hypoxia, while only 4% were attributed to infections.[15] Similarly, a Surinamese study found that 39% of perinatal deaths remained unexplained despite adequate medical documentation.[17]

These findings highlight the important role of placental cultures, radiological examinations, and autopsies in reducing the proportion of unexplained deaths. They also emphasize the urgent need to strengthen antenatal care, improve emergency obstetric services, and integrate advanced diagnostic techniques to enhance the classification of perinatal deaths and reduce preventable mortality.

Patterns of perinatal mortality vary significantly between developed and resource-limited developing settings. Studies have reported that approximately 50% of stillbirths in low-resource settings occur during the

intrapartum period, whereas in developed nations, most stillbirths occur during the antepartum period.[18]

Despite being conducted in a developing country, this study found a higher proportion of antepartum deaths compared to intrapartum deaths, likely due to better intrapartum care services at our tertiary care hospital. However, the persistence of antepartum perinatal deaths highlights the urgent need to improve antenatal care quality to further reduce mortality.

Using the ICD-PM classification, we observed that deaths due to prematurity (A5, I6, N9) predominantly occurred in the antepartum period, with maternal complications being the major contributing factor.[19] This underscores the importance of enhancing antenatal care utilization, promoting facility-based deliveries, and improving maternal health services to reduce these preventable deaths.

Additionally, more than a quarter of early neonatal deaths were attributed to low birth weight, reinforcing the need for greater investment in antenatal interventions, such as nutritional support and maternal health monitoring.[19] Among cases with unspecified neonatal causes of death, nearly 30% were linked to placental, cord, and membrane complications, including premature rupture of membranes (PROM), placental abruption, and antepartum hemorrhage.[20] This highlights the critical role of timely antibiotic administration in PROM and the need for early recognition and emergency obstetric interventions in cases of placental abruption.

Furthermore, preterm labor and low birth weight were identified as major causes of neonatal death, emphasizing the necessity of targeted interventions to lower perinatal mortality, particularly in low- and middle-income countries.

Challenges in accurately classifying fetal growth-related disorders (A3, I6, N9) were noted due to limited access to early ultrasound for precise pregnancy dating. This limitation makes it difficult to detect fetal growth restriction, which is a key contributor to perinatal deaths. Another limitation of our study was the subjectivity in assessing maceration based on visual fetal examination by healthcare professionals. Additionally, the lack of postmortem examinations limited our ability to determine the exact causes of stillbirths, particularly those related to congenital infections. Moreover, underreporting of early neonatal deaths may have occurred, as some cases were lost to follow-up within the first seven days after birth. Despite these limitations, a major strength of this study was the prospective maintenance of ICD-PM records under the supervision of an experienced investigator, ensuring high-quality data collection and classification. Although no global classification system is entirely perfect, the ICD-PM framework remains valuable as it emphasizes the mother–baby dyad and enhances perinatal death reporting and analysis. However, a recent systematic review identified underutilization of ICD-PM and suggested that certain limitations in its classification system should be addressed in future guideline updates.[21] Addressing these gaps could further refine perinatal death classification and improve maternal and neonatal outcomes worldwide.

Conclusion

The application of the ICD-PM classification revealed that antepartum deaths were the most common, primarily due to maternal medical and surgical conditions (M4), while intrapartum deaths were mainly associated with labor complications (M3). Neonatal deaths were largely attributed to prematurity and low birth weight, emphasizing the need for enhanced neonatal care services.

The high proportion of deaths due to placental complications (M1) highlights the importance of early detection and timely interventions. These findings underscore the critical need for improved antenatal care, better intrapartum monitoring, and emergency obstetric care.

Standardizing ICD-PM classification nationwide could provide accurate data for strategic planning, aiding in the reduction of preventable perinatal deaths and supporting efforts to achieve global health targets.

References

1. Legu KL, Debiso AT, Rodamo KM. The magnitude of perinatal mortality rate and associated risk factors among deliveries at Dilla University Referral Hospital, Southern Ethiopia: A case-control study. Healthc Low-Resour Settings.2021;9(1):9960. https://doi.org/10.4081/hls.2021.9960
2. Ali MM, Bellizzi S, Boerma T. Measuring stillbirth and perinatal mortality rates through household surveys: a population-based analysis using an integrated approach to data quality assessment and adjustment with 157 surveys from 53 countries. Lancet Glob Health. 2023 Jun;11(6):e854-61. https://doi.org/10.1016/S2214-109X(23)00125-0
3. UN Inter-agency Group for Child Mortality Estimation. A neglected tragedy: the global burden of stillbirths [Internet]. 2020 [cited 2022 Jan 15]. Available from:

https://data.unicef.org/resources/a-neglected-tragedy-stillbirth-estimates-report/
4. World Health Organization. Sustainable Development Goals (SDG) [Internet]. 2020 [cited 2022 Jan 15]. Available from: https://www.who.int/health-topics/sustainable-development-goals#tab=tab_1
5. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, et al. Global, regional, and national causes of child mortality in 2000–2013, with projections to inform post-2015 priorities: an updated systematic analysis. Lancet. 2015;385(9966):430-40. https://doi.org/10.1016/S0140-6736(14)61698-6
6. Kerber KJ, Mathai M, Lewis G, Flenady V, Erwich JJ, Segun T, et al. Counting every stillbirth and neonatal death through mortality audit to improve quality of care for every pregnant woman and her baby. BMC Pregnancy Childbirth. 2015;15(Suppl 2):S9. https://doi.org/10.1186/1471-2393-15-S2-S9
7. Allanson ER, Tunçalp Ö, Gardosi J, Pattinson RC, Vogel JP, Erwich JJ, et al. Giving a voice to millions: developing the WHO application of ICD-10 to deaths during the perinatal period: ICD-PM. BJOG. 2016 Nov;123(12):1896-9. https://doi.org/10.1111/1471-0528.14243
8. Housseine N, Snieder A, Binsillim M, Meguid T, Browne JL, Rijken MJ. The application of WHO ICD-PM: Feasibility for the classification of timing and causes of perinatal deaths in a busy birth centre in a low-income country. PLoS One. 2021 Jan 14;16(1):e0245196. https://doi.org/10.1371/journal.pone.0245196
9. Meraji M, Jafari M. Can International Classification of Disease Perinatal Mortality (ICD-PM) be a solution to overcome neglected tragedy? A scoping review. Health Sci Rep.2024;7(11):e70134. https://doi.org/10.1002/hsr2.70134
10. Allanson ER, Tunçalp Ö, Gardosi J, et al. The WHO application of ICD-10 to deaths during the perinatal period (ICD-PM): results from pilot database testing in South Africa and United Kingdom. BJOG. 2016;123(12):2019-28. https://doi.org/10.1111/1471-0528.14244
11. Priyani AA, Thuvarakan P, De Silva MV. Classification of perinatal deaths according to ICD-PM: an audit on perinatal post-mortems in a tertiary care centre in Sri Lanka. Sri Lanka J Obstet Gynaecol. 2017 Jun;39(2). https://doi.org/10.4038/sljog.v39i2.7811
12. Perveen F, Tayyab S, Zubairi BF. Risk factors of perinatal deaths in Pakistan. J Obstet Gynaecol Res. 2011;37(5):443-8. https://doi.org/10.1111/j.1447-0756.2011.01236.x
13. Rabia S, Perveen F, Uddin SS, Tabassum R, Ali A. Stillbirth: frequency and correlates of acute maternal morbidity (SAMM) & maternal deaths at a tertiary health care center. Prof Med J. 2013;20(4):542-9. https://doi.org/10.29309/TPMJ/2013.20.04.1109
14. Wang H, Bhutta ZA, Coates MM, Coggeshall M, Dandona L, Diallo K, et al. Global, regional, national, and selected subnational levels of stillbirth, neonatal, infant, and under-5 mortality, 1980-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet. 2016;388(10053):1725-74.
15. Piryani AAH, Thuvarakan P, De Silva MVC. Classification of perinatal deaths according to ICD-PM: an audit on perinatal post-mortems in a tertiary care center in Sri Lanka. J Obstet Gynaecol. 2017;39(2). https://doi.org/10.4038/sljog.v39i2.7811
16. Housseine N, Snieder A, Binsillim M, Megvid T, Browne JL, Rijken MJ. The application of WHO ICD-PM: feasibility for the classification of timing and causes of perinatal deaths in a busy birth center in a low-income country. PLoS One. 2021;16(1):e0245196. https://doi.org/10.1371/journal.pone.0245196
17. Prust ZDP, Verschuren KJ, Bikha K, Kodam LR, Bloemenkamp KW, Browne JL, et al. Investigation of stillbirth causes in Suriname: application of the WHO ICD-PM tool to national-level hospital data. Glob Health Action.2020;13(1):1794105. https://doi.org/10.1080/16549716.2020.1794105
18. Aminu M, Mathai M, Vanden Broek N. Application of the ICD-PM classification system to stillbirths in five sub-Saharan African countries. PLoS One. 2019;14(1):e0215864. https://doi.org/10.1371/journal.pone.0215864
19. Lavin T, Allanson ER, Nedkoff L, Preen DB, Pattinson RC. Applying the International Classification of Diseases to perinatal mortality data in South Africa. Bull World Health Organ.2018;96(11):806-16. https://doi.org/10.2471/BLT.17.206631
20. Allanson ER, Vogel JP, Tunçalp Ö, Gardosi J, Pattinson RC, Erwich JJ, et al. Application of ICD-PM to preterm-related neonatal deaths in South Africa and the United Kingdom. BJOG.2016;123(12):2029-36. https://doi.org/10.1111/1471-0528.14245
21. Zita DP, Akker TD, Kodan RL, Bloemenkamp KW, Rijken MJ, Verschuren KJ. The global use of the International Classification of Diseases for perinatal mortality (ICD-PM): a systematic review. J Glob Health. 2022;17:04069. https://doi.org/10.7189/jogh.12.04069