Use of the Maternal Foetal Triage Index- Addressing the Third Delay in Obstetrics: An Observational Study

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May 19, 2021

Abstract

OBJECTIVE: The Maternal Foetal Triage Index (MFTI), a five-tier scale designed by Ruhl et al (2015) has been evaluated in this study for women attending the triage area of a tertiary hospital, to examine the effect on third delay and maternal and neonatal outcomes. DESIGN: Prospective observational study SETTING: The Labour and Delivery Unit of a tertiary care hospital SAMPLE: A convenience sample of 1000 women METHODS: Assessment included maternal history, baseline vital signs and obstetric examination and categorised the woman as per the MFTI scale. Evaluation of the MFTI score was assessed based on predefined maternal and neonatal outcomes within 24h of attendance. MAIN OUTCOME MEASURES: Flow of patients to triage, presenting complaints, Duration of hospital stay, maternal and neonatal outcomes within 24h of admission. RESULTS: A priority wise distribution of subjects based on their clinical diagnosis was found to be statistically significant for anaemia, previous caesarean, postpartum haemorrhage, miscarriage and hypertensive disorders. Sixty seven percent of the subjects belonged to Priority 3-4 and the mean hospital stay duration varied from 8.26±7.68 days for Priority 1 to 3.82±2.74 days for Priority 4 ((p<0.0001). The average time spent in the triage room was 30±17minutes. A priority wise analysis of maternal and neonatal outcomes based on OBICU and NICU admissions, mortality and stillbirths was found to be significant. CONCLUSION: The MFTI scale significantly reduced the third delay, which is crucial in a high-volume, low resource setting. This also simplified handover, improved documentation and decreased time to secondary healthcare provider assessment. KEYWORDS:obstetrictriage,acuity,thirddelay,maternalmortality

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RUNNING TITLE: Evaluating MFTI Scale in Reducing Third Delay

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DESIGN: Prospective observational study

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METHODS: Assessment included maternal history, baseline vital signs and obstetric examination and categorised the woman as per the MFTI scale. Evaluation of the MFTI score was assessed based on predefined maternal and neonatal outcomes within 24h of attendance.

MAIN OUTCOME MEASURES: Flow of patients to triage, presenting complaints, Duration of hospital stay, maternal and neonatal outcomes within 24h of admission.

RESULTS: A priority wise distribution of subjects based on their clinical diagnosis was found to be statistically significant for anaemia, previous caesarean, postpartum haemorrhage, miscarriage and hypertensive disorders. Sixty seven percent of the subjects belonged to Priority 3-4 and the mean hospital stay duration varied from 8.26±7.68 days for Priority 1 to 3.82±2.74 days for Priority 4 ((p<0.0001). The average time spent in the triage room was 30±17minutes. A priority wise analysis of maternal and neonatal outcomes based on OBICU and NICU admissions, mortality and stillbirths was found to be significant.

CONCLUSION: The MFTI scale significantly reduced the third delay, which is crucial in a high-volume, low resource setting. This also simplified handover, improved documentation and decreased time to secondary healthcare provider assessment.

FUNDING: None

KEY WORDS: obstetric triage, maternal mortality, third delay, acuity, maternal fetal triage index

TWEETABLE ABSTRACT: Implementation of MFTI scale significantly reduces third delay in high volume low resource settings: an observational study

INTRODUCTION:

Obstetric Triage is emerging as a specialized segment of care for both outpatient and inpatient management of women in pregnancy. The word “triage” is derived from a French word “trier’ and was originally used for sorting mass casualties in the battlefield [1]. Obstetric triage is more specialized than general and trauma triage, as it involves assessing whether the patient is in labour, the foetal well-being and risk stratification

of the pregnant woman. The role of obstetric triage and its impact on adverse maternal outcomes remains unexplored in developing countries.

Women often have to wait for assessment and treatment after reaching the health care facility. This delay within facilities is known as the "third delay". International guidelines recommend that assessment should begin within 10 minutes of the patient reaching hospital [2]. Use of a validated tool to facilitate this initial assessment process will improve the quality of care in high volume obstetric facilities. Generally, obstetric triage volume will be about 20% to 50% higher than total hospital birth volume with most women presenting for presumed labour at term. however, women may also be seen for other complaints like preterm labour, preterm premature rupture of membranes, preeclampsia symptoms, decreased foetal movement, trauma, bleeding, or any other medical condition related or unrelated to pregnancy.

Goodman et al in a study in Ghana found that an obstetric triage improvement programme reduced the median patient waiting time from facility arrival to first assessment by a midwife, from 40 min (15–100) to 5 min (2–6) ($p<0.001$) over the 5-year intervention [3].

The Maternal Foetal Triage Index (MFTI) designed by Ruhl et al [4] offers a standard method of assigning an acuity score to pregnant women presenting to the hospital for care. It is thought to be the first OB triage acuity tool validated for multidisciplinary use [5]. It uses a five-level scale for categorizing acuity. The five tiers are: "1-Stat" requires immediate lifesaving intervention for a woman or her foetus; "2-Urgent" includes severe pain not related to contractions, high-risk clinical condition, and/or the need for transfer to a higher level of care; "3-Prompt" includes women at or over 34 weeks gestation in active labour; "4-Non-Urgent" includes women at term gestation in early labour; and "5-Scheduled or Requesting a Service" includes women presenting for scheduled procedures or routine prenatal care.

This study was designed to evaluate the role of a dedicated triage tool in pregnant women attending the Labour and delivery unit of a tertiary level teaching hospital.

METHODS

This was a prospective observational study on a convenience sample of 1000 consecutively enrolled subjects coming to the Labour and Delivery unit of the hospital, during the 24-hr emergency duty of the second unit, which is every fifth day, not excluding weekdays, weekends or public holidays. A separate room in the labour and delivery unit was assigned as a triage room. This room had two beds and a facility for emergency management and foetal well-being assessment. Assessment according to the MFTI was conducted by the first author, during the second year of her residency a (2019-2020) when she was posted in the triage area. All patients were examined by a single operator to ensure consistency.

There were no exclusion criteria. Assessment included maternal history, baseline vital signs, pulse oximetry, abdominal palpation and auscultation of the foetal heart rate along with determination of active vs latent phase of labour. Based on this assessment, the woman was categorised as per the MFTI scale (Figure 1).

Depending upon the level of urgency/acuity as defined by the scale, the woman was sent to the appropriate area. Women with higher level of clinical urgency were taken immediately to ICU or operation theatre. Women with lower levels of urgency were sent to the active labour room or observation areas/wards.

OUTCOMES:

1. Number of women having triage assessment using the MFTI scale

2. Common presenting complaints

3. Flow of subjects from triage

4. Time to admission/discharge

5. Reliability and validity of the assigned category of urgency following the initial triage assessment was undertaken by reviewing the notes of women/babies who had predefined outcomes within 24 h of attendance

(these included maternal admission to High Dependency Unit/Intensive Therapy Unit or death, category 1 Caesarean Section, active neonatal resuscitation, Apgar <7 at 5 min, routine care, initial steps of resuscitation, requirement of bag and mask or bag and tube ventilation, chest compressions or medication or neonatal admission to Neonatal Intensive Care Unit or neonatal death).

STATISTICAL ANALYSIS: Descriptive statistics was applied to analyse the data. Data was entered in an Excel sheet. The Chi Square test was used for analysis of continuous quantitative data and Anova test was applied for analysis of categorical qualitative data. A p value of less than 0.05 was considered significant.

FUNDING: None

RESULTS

The mean maternal age was 24.5 + 4.3 years, mean gestational age was 35.6 + 6.1 weeks. Forty-four percent (44.1%) of the subjects were primigravida and 55.9% were multigravidas. Fifty two percent (52.1%) subjects were booked cases at the hospital, whereas 31.8% were referred from other hospitals and only 16.2% presented as self-referred cases. Labour pain (82.9%), leaking per vaginum (25.9%) and hypertension (11.5%) were the most common presenting complaints for subjects. The average time spent in the triage room was 30±17minutes.

Table 1 shows that hypertensive disorders including preeclampsia and eclampsia constituted 115 (11.5%) of the total subjects, preterm labour constituted 270 (27%), anaemia 93(9.3%) and previous caesarean section 107(10.7%). Priority wise distribution of subjects with hypertensive disorders, anaemia and previous caesarean section was highly significant. Miscarriage and postpartum haemorrhage were the other conditions that were assigned priority 1-2. The clinical diagnoses assigned were not mutually exclusive, and they are not collectively exhaustive.

Table 2 shows the distribution of subjects by MFTI scale and duration of hospital stay. The duration of hospital stay was 8.26±7.68 days for Priority 1, 7.02±7.26 days for Priority 2, 6.27±6.65 days for Priority 3 and 3.82±2.74 days for Priority 4. These observations were statistically significant at p<0. 0001.This is an effective indicator of maternal morbidity.

Table 3 shows ICU and non-ICU admission according to priority by MFTI scale. Seventy-six subjects were admitted to the obstetric ICU (OBICU), which entails mechanical ventilation, blood transfusion, inotropic support and higher antibiotics and led to additional maternal morbidity. Nine hundred and twenty-four subjects were assigned non-ICU management. Of the ninety-nine Priority 1 subjects requiring non-ICU management 37 (37.4%) required immediate admission to operation theatre and 62 (62.62%) were managed in the active labour as childbirth was imminent. Of the 138 Priority 2 subjects assigned to a non OBICU management, 26 (18.8%) were managed in the operation theatre and the remaining were admitted to the delivery unit for imminent birth. The observations were statistically significant at a p value of 0.0001.

There were two maternal deaths in the Priority 1 group and 1 death in priority 2. The causes were septic peritonitis, puerperal sepsis and pulmonary embolism.

Table 4 shows the adverse perinatal outcomes associated with the acuity scale. The number of NICU admissions and still births were significantly more in Priority 1 and 2 as compared to Priority 3 and 4.

Table 5 shows the priority wise distribution of patients according to booking status and referral status. It can be concluded that referred patients were more likely to be of higher MFTI Priority, X^2 (8, N=1000) = 92.168, P<0.00001.

DISCUSSION

This prospective observational study aimed to evaluate the MFTI score on a convenience sample of women attending the triage room of the labour and delivery unit. In this study the Maternal Foetal Triage Index was used as a systematic tool for assessment of these subjects.

MAIN FINDINGS

The average time spent in the triage room was 30±17minutes during the study period, thus reducing the third delay in Obstetrics. The duration of hospital stay was significantly higher at (8.26+ 7.68) in priority 1 subjects as compared to the lower priorities. Intrauterine foetal demise, unless previously diagnosed, was categorised as Priority 1. Extreme prematurity of less than 34 weeks with detectable uterine contractions or SROM or cervical dilatation/incompetence was categorised as Priority 2.

Hypertensive disorders in pregnancy (115, 11.5%), preterm labour (270,27%), anaemia (93,9.3%) and early pregnancy loss (46, 4.6%) constituted the most common clinical conditions assigned to Priority 1-2. Previous Caesarean section was the most common clinical condition assigned to Priority 3-4.

Ruhl et al (2015) have stated that the quality of patient care is improved by the use of a standardised ED triage scale, according to the American College of Emergency Physicians [4]. Forshaw et al (2016) conducted an audit which concluded that instead of an informal triage at the admissions desk, a systematic standardised flow diagram should be used at the admissions desk and the presence of a midwife ensured there. This reduced the time from entering the department to first assessment from 192 min to 38 min. [6]. Goodman et al (2017) conducted a study in Accra, Ghana where the third delay and time spent in triage was analysed according to the time of day, day of week and the reason for referral. The median wait time interval till assessment (the third delay) was 40min (interquartile range 15-100min). The median time spent in triage was significantly longer at night [55min (15-120)], than the morning [35min (10-830] and evening [28min (12-51)] shifts ($p<0.0004$). There was no significant difference based on day of week either in volume or waiting times ($p=0.38$). [7]

Brown et al (2019) conducted a study that demonstrated that nurses could implement an acuity-based triage process where the number of roomed triage subjects, number of subjects waiting to be triaged and the overall unit census could be recorded in a timely manner. The time from presentation to nurse assessment decreased by more than 50% with the use of acuity based obstetric triage [8].

STRENGTHS AND LIMITATIONS

The MFTI scale was selected because it was applicable to subjects with less than 20 weeks gestation and postpartum unlike other triage scales. This study brings to light the importance of obstetric triage in improving maternal and neonatal outcomes by reducing the third delay. This is all the more significant since triage is not a widely discussed topic in medical literature. Hence it was not possible to make robust comparisons with other studies. Since there was no previous measurement of third delay prior to this study, hence a parallel comparator arm is not available. The study would have been more robust if it had been possible to segregate the third delay as per the MFTI subcategory. However, this could not be done. Once use of a systematic triage tool becomes a standard of care across all facilities, audits could be conducted to assess the efficacy.

INTERPRETATION

This study found that use of a systematic triage tool improved the time spent by the woman after reaching the hospital. While this study used a makeshift triage area with minimum facilities, a dedicated triage area equipped with monitors, primary assessment and initial treatment should be made available at the entrance of the labour and delivery area. A systematic triage tool and triage assessment form should be used. Nurse midwives could be trained specifically in OB triage.

CONCLUSION

Use of a systematic triage tool such as the MFTI scale helped to reduce the time spent by the subject in initial assessment, thus reducing the third delay. This is crucial in a high volume, low resource emergency obstetric setting. Use of a formal triage tool helped to make handover of subjects easier, improved documentation and decreased the length of time to secondary healthcare provider assessment for higher acuity subjects.

ACKNOWLEDGEMENTS

I would like to acknowledge the contributions of Dr Sahana SM and Dr Vishakha Ahuja to the conduct of this study and the development of this article.

CONFLICT OF INTEREST

None

CONTRIBUTION TO AUTHORSHIP

Dr Nirzarini Vora prepared the original draft, collected and prepared the data and played a role in the analysis and interpretation of data. Dr N K Maitra had a significant contribution to the conception and design of the study, protocol formulation, analysis and interpretation of data and preparing the final writeup. Dr Priyam Pandya also contributed to data collection and preparation.

ETHICAL APPROVAL: The study protocol was approved by the Institutional Ethics Committee Reference No. IECBHR/167-2020. Informed consent was obtained from all individual participants in the study.

FUNDING: No funding was obtained

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LIST OF TABLES

LIST OF FIGURES

TABLES

Table 1: Distribution of subjects according to Priority and Final Clinical Diagnosis

Clinical Diagnosis	Priority 1 - 2 No (%)	Priority 3-4 No (%)	P Value	Goodman et al (2017)
Hypertensive disorder (n=115)	70 (60.87)	45 (39.13)	P = 0.0369	139(9.8%)
Anaemia (n=93)	64 (68.82)	29 (31.18)	P = 0.0015	103(7.2%)
Previous Caesarean Section (n=107)	22 (20.56)	85 (79.44)	P < 0.0001	129 (9.1%)
Non-Reassuring Foetal Status (n=51)	35 (68.63)	16 (31.37)	P = 0.0286	83 (5.8%)
Foetal Malpresentation/Disproportion (n=56)	21 (37.50)	35 (62.50)	P = 0.1239	408 (28.7%)
Multiple Gestation (n=12)	3 (25)	9 (75)	P = 0.3894	26 (1.8)
Early Pregnancy Loss (n=46)	35 (76.09)	11 (23.91)	P = 0.0055	
Preterm Labour (n=270)	141 (52.22)	129 (47.78)	P = 0.5438	29 (2%)
Postpartum hemorrhage (n=23)	23 (100)	0	NA	39 (2.7%)
Term Labour (n=492)	79(16.05)	411 (83.53)	P <0.0001	45 (3.2%)
Others (n=138)	71 (51.45)	67 (48.55)	P = 0.8648	

Table 2: Overall Distribution of Subjects by MFTI Scale

MFTI Scale	No.	(%)	Duration of Hospital Stay (Mean ±SD)
Priority 1	144	14.40	8.26 ±7.68
Priority 2	163	16.30	7.02 ±7.26
Priority 3	225	22.50	6.27 ±6.65
Priority 4	465	46.50	3.82 ±2.74
Priority 5	3	0.30	3.33 ±0.58

Table 3: ICU Admissions According to MFTI Scale

MFTI Scale	ICU Admission No. (%)	Non ICU Admission No. (%)	P value
Priority 1 (n=144)	45 (59%)	99 (10.7%)	P < 0.0001
Priority 2 (n=163)	25 (32.8%)	138 (14.9%)	P = 0.0608
Priority 3 (n=225)	5 (6.57%)	220 (23.8%)	P = 0.7146
Priority 4 (n=465)	1 (1.31%)	464 (50.2%)	P = 0.9806
Priority 5 (n=3)	0	3 (0.003%)	NA
Chi-Square Test P-value	P < 0.0001		

Table 4: NICU admissions and Stillbirths Based on Initial Assessment of Acuity

MFTI Scale	NICU admission (n=153)	NICU admission (n=153)	Stillbirth (n=44)	Stillbirth (n=44)
	No.	**%**	**No.**	**%**
Priority 1& 2	95	62.09%	41	93.18%
Priority 3 & 4	58	37.91%	3	6.82%
Total	153	100%	44	100%
P value for Priority 1 & 2 vs Priority 3 & 4	P value for Priority 1 & 2 vs Priority 3 & 4	P = 0.0061		P = 0.0006

Table 5: Booked/Referred/Emergency by MFTI Scale

MFTI Scale	**Booked**	**Booked**	**Referred**	**Referred**	**Emerge**
	No.	**%**	**No.**	**%**	**No.**
Priority 1	45	31.25	79	54.86	20
Priority 2	53	32.52	75	46.01	35
Priority 3	128	56.89	67	29.78	30
Priority 4	293	63.01	97	20.86	75
Priority 5	2	66.67	0	0.00	1
Total	521	52.10	318	31.80	161
Chi Square = 92.168 Degree of freedom= 8 N= 1000 P<0.00001