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Study of the functioning of the casualty department of obstetrics and gynecology in a tertiary care hospital

Objectives

Delay of more than 4 hours in admitting patients from the time of arrival in emergency department has adverse outcomes. With no study available related to Obstetrics emergency department, our study aimed to assess the emergency obstetrics department's functioning in a tertiary care hospital, focusing on admission times, critically ill cases, referrals, and need for surgical intervention to improve patient outcomes. METHODS We did an observational study in a tertiary care hospital's obstetrics emergency department over 4 months (April-July 2024) and reviewed 1000 cases by hospital records. Data related to arrival time and admission, day/night variations, referral cases, critical care admissions, surgical interventions and mortalities was collected. The study correlated arrival to admission time with various factors RESULTS On analyzing 1000 cases, we found a mean admission time from casualty arrival of 2.7 hours (day- 2.7 hours, night- 2.5 hours, $p<0.05$), with 58.6% requiring admission, and 18.8% needing immediate surgery. Intensive monitoring was required in 75% of admitted patients with 1 mortality. The referred cases were 25.6% with maximum referrals from Delhi. Patient volume and admission frequency positively correlated (R=0.77 and R=0.38 respectively) with admission time. CONCLUSIONS The mean admission time from casualty to ward was within the 4-hour international standard. It wasn't significantly affected by patient referral status, or need for critical care/surgery. Increased workload correlated with longer admission times (R=0.77). Thus, establishing a benchmark for admission time in the emergency of obstetrics and gynecology department in a Government tertiary care hospital and identified potential areas of improvement.

Keywords: obstetrics emergency, mortality, gynecology, laboratory investigations

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Introduction

In India, health is a state subject and the public sector makes provision to provide free service to all citizens through a 3-tiered health care infrastructure which include primary health centre, community health centre and the district health centre. Government hospitals mostly provide free treatment or impose minimal charges. The other health care provider is the paid private sector. Most tertiary care hospitals are equipped with emergency department which serve as primary triage area and provide immediate medical attention to the needy. They sometimes also serve as portals for indoor admission. Although crowding in public sector emergency departments has always been an issue, it has been getting worse over the past decade. Some of this crowding is a result of the number of patients receiving care, availability of indoor beds, as well as the ratio of the health care professionals to the incoming patient load. The use of the emergency department for non-urgent health conditions is another contributory factor.

Delays to timely admission from emergency department are considered major cause of increased morbidity and mortality. It is often considered as important quality parameter for emergency department and also the subject matter for patient related outcomes. Based on various studies, delays to inpatient admissions in excess of 5 hours in a hospital from the time of arrival at the casualty department is generally considered as lowered standard as it associated with an increase in mortality.[1]

Although widely postulated that delay in emergency department can worsen patient outcomes, there are no national data on emergency department visits or average emergency department to ward admission time in India. One study from a tertiary care institute in North India investigated the effect of delayed transfer of critically ill patients to intensive care unit from emergency department and the various factors related to that were emergency department related, patient-related factors, administrative factors, and ICU-related factors.[2]

An Egyptian study also identified certain factors responsible for delay in admissions from casuality: Registration process, time spent from registration until decision to admit, initial assessment and resuscitation, time spent from initial assessment until intervention started and delays in laboratory investigations.[3]

Obstetric emergencies hold a distinction from other specialties as the delay may contribute to adverse maternal and neonatal outcomes. Therefore, in view to provide improved mother and child services, dedicated obstetric and pediatric services are generally operational in tertiary care centers. A thorough search of indexed literature revealed no studies related to functioning of emergency department of Obstetrics and Gynecology in a government set up and the various associated timelines. This study was planned to study and provide a reference value for the admission time in day and night hours from a busy obstetrics emergency department in a tertiary care hospital. We also aimed to find proportion of referrals, critically ill cases and cases requiring surgical interventions out of total admissions. This would help provide inputs for better utilization of existing hospital resources and planning for future.

Materials & methods

We conducted a cross-sectional descriptive study over 4 months (April 2024 – July 2024) in the Obstetrics and Gynaecology department

of a 1000 bedded tertiary care hospital attached with medical college catering the health care needs for the Delhi community and surrounding border areas. The department has heavy workload with mean OPD of 855 patients/ day; mean indoor admissions 96 patients/ day; mean casualty admissions 54/day; mean bed occupancy 110% and mean deliveries in a day - 39. We screened causality and ward register for data collection. All patients admitted via casualty of the Department of Obstetrics and Gynecology as per casualty register were included in study while patients admitted via outpatient department were excluded. Cases were defined as all patients admitted via casualty of the Department of Obstetrics and Gynecology. A Critical case was defined as requiring intensive care unit admission within 24 hours of admission.

Based on our institutional statistics (2023), the average rate of admission from casualty in department of Obstetrics and Gynecology is approximately 35 per day. The study was conducted on 10 days of a month for 4 months (total 40 days) as per ethical guidelines, and a convenient sample size of 1000 cases was taken for pilot study.

For last 10 days of every month, casualty and wards register were assessed for noting the time of arrival of cases and two groups were assigned as follows: Group A: admissions done from 8AM-7.59 PM, day timings; Group B: admissions done from 8PM-7.59 AM, night timings. Total number of casualty attendance of 24 hours for the same days were also be noted from the register. Admissions for casualty were done in 3 wards; septic labour room (SLR), high risk labour room (CLR) and low risk labour room (LR1). Hence, time of admission to ward of all cases was noted from register maintained in these three areas. The study tracked cases for 24 hours to note transfers to critical care and mortalities, and also recorded cases requiring surgical intervention within 6 hours and those presenting with referral slips.

The data was collected and entered in Microsoft Excel sheet and analysis using Epi info latest software.The descriptive data was expressed as numbers, proportions and percentages. The quantitative data for various time periods was compared using unpaired student t test. The subgroup analysis included comparisons between day and night. Pearson's correlation coefficient was calculated for total casualty patients attended and total patients admitted per 24 hours to mean admission time. A p value of <0.05 was be taken as significant.

Results

In total, information of 1001 patients was recorded. The mean age of patients presenting to casualty was 26.9 years±4.9 years. The time from total casualty arrival to admission in ward was 164.2 minutes±112.7 minutes [range, 0-708 minutes]. This mean time expressed in hours is 2.7 hours. The time from casualty arrival to admission time during day hours (8AM-7.59PM) was 175.1 minutes±117.7 minutes [range, 5-708 minutes]. This mean time expressed in hours is 2.9 hours. The time from casualty arrival to admission time during night hours (8PM-7.59AM) was 152.1 minutes±105.6 minutes [range, 0-675 minutes]. The mean time expressed in hours is 2.5 hours.

Admission time was more than 4 hours in approximately 22% (117/528 admissions) during the day hours and 15% during night hours (69/473 admissions). The mean number of casualty patients attended in a day were 88±19.9. The mean number of admissions in a day from casualty department were 51.6±10.2. Of the total patients attending the casualty of Obstetrics and Gynecology department, approximately 58.6% required admission and evaluation.

Mean number of casualty doctors was 3.7 (range, 3-4). The number of referred cases was 256 (25.6%). The main referrals were from Delhi region (n=185), Uttar Pradesh (n=67), Bihar (n=3) and Gujrat (n=1). The highest referrals were from the neighboring state Uttar Pradesh (26%). There was one death (0.1%) among the total admissions. Nine patients (0.9%) required critical care admissions. Six of these patients were initially admitted to high-risk labour room and three in septic labour room. Of these 8 patients required surgical intervention. One reported death also occurred in this group only. One hundred eighty-eight patients (18.8%) required immediate surgical intervention

Of the admitted patients, 534 patients (53.3%) were admitted in high-risk labour room, 248 (24.7%) in low-risk labour room and 219 (21.9%) in septic labour room. Thus, nearly a combined 75% admitted patients requiring intensive monitoring either because they were in the high-risk category or suffered some infection.

The various variables affecting admission time are listed in Table 1. The category wise admission to the different labour room admission as per patient profile is detailed in Table 2. Mean time of admission in relation to the total casualty patients attended (foot fall) in 24 hours is depicted in Table 3. Table 4 shows the mean time of admission in relation to the total admissions/ 24 hours.

Table 1 Various variables affecting admission time

	Parameter		Variable studied		P value#	95%CI
1	Diurnal variation		Day shift	Night shift		
		n= total number of admissions	n=528	n=473		
		Admission time (in minutes)	175.1±117.7	152.1±105.6	0.0012	**9.12 to 37.01**
2	Casualty doctors		Three doctors on duty/shift	Four doctors on duty/shift		
		Admission time (in minutes)	169.9±108.9	161.4±114.5	0.2584	-6.28 to 23.30
3	Referral status		Non referred	Referred		
		n= number of patients	n=745	n=256		
		Admission time (in minutes)	163.9±114.1	165.4±108.7	0.8514	-17.57 to 14.51
4	Critical care unit admission		Critical care admission	Critical care admission not present		
		n= number of patients	n=9	n=992		
		Admission time (in minutes)	205.0±114.5	163.9±112.6	0.2758	-32.98 to 115.24

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Table 1 Continued...

5	Surgery		Surgical intervention	No surgical intervention		
		n= number of patients	n= 188	n=813		
		Admission time (in minutes)	167.4±106.6	163.5±114.1	0.6740	-14.08 to 21.76

*Bold figure indicates statistically significant values

Unpaired student- t test

Table 2 Category of labour room admission as per patient profile

Category of labour room admission as per patient profile		Subgroup comparison of patient profile as per risk stratification and sepsis status		P value#	95%CI
1	High risk versus low risk cases (n= number of patients)	High risk labour room (n=534)	Low risk labour room (n=248)		
	Admission time (in minutes)	166.4±106.9	146.6±96.7	0.0131	4.16 to 35.50
2	Septic cases versus low risk cases (n= number of patients)	Septic labour room (n=219)	Low risk labour room (n=248)		
	Admission time (in minutes)	178.8±138.2	146.6±96.7	0.0034	10.71 to 53.71
3	High risk cases versus septic cases (n= number of patients)	High risk labour room (n=534)	Septic labour room (n=219)		
	Admission time (in minutes)	166.4±106.9	178.8±138.2	0.1871	-6.04 to 30.81

*Bold figure indicates statistically significant values

Unpaired student- t test.

Table 3 Mean time of admission in relation to the total casualty patients attended (foot fall) in 24 hours

Categories as per foot fall of patients/ 24 hours	Frequency	Mean time taken for admission (in minutes)
<60	**59**	**145.8**
61-80	331	163.4
81-100	370	168.4
101-120	177	165.6
121-140	-	-
>140	64	157.8

Correlation of total casualty patients attended per 24 hours to mean admission time; R is 0.7762 (p=0.122). The result is *not* significant at p < 0.05.

Table 4 Mean time of admission in relation to the total admissions/ 24 hours

Categories as per total admissions/ 24 hours	Frequency	Mean time taken for admission (in minutes)
31-40	78	170.1
41-50	466	163.8
51-60	254	169.5
61-70	152	163.6
71-80	54	135.8

Correlation of total patients admitted per 24 hours to mean admission time, R is 0.3844 (p=0.522). The result is *not* significant at p < 0.05.

Discussion

Our hospital being tertiary care facility of Delhi and catering population of adjacent states also, there is heavy work load and foot fall in the Obstetrics and Gynecology casualty with over 88 patients attended in a day. It is usually manned by 3-4 doctors per shift. This study aimed to evaluate arrival to admission time of 1001 patients admitted via casualty. In our study we found nearly 60% of total footfall required admission for further evaluation/ intervention, thereby indicating significant number of sick patients reaching the casualty. The patients were mostly young women with mean age 26.9 years. The mean time from casualty arrival to admission in ward was 2.7 hours which was well within the prescribed time standards.[4] During the day hours (8AM-7.59PM), this time was slightly higher, 2.9 hours while in night hours (8PM-7.59AM) this reduced to 2.5 hours ($p<0.05$). The probable reasons behind higher timelines during the day hours was increased work load with total number of admissions in day hours observed to be 528 while 473 during night hours. A north Indian study by Tiwari et al.,[5] at a tertiary level health care institute on arrival time pattern in casualty found peak arrival time to be 9.00AM-12.00 noon (26.3%) in summer month of May.[5] They studied the waiting time, inter arrival time between two consecutive patients in addition to daily census data (discharge rate, admission rate and the transfer out rates) of the casualty area. They concluded that patient flow can only be addressed by multifaceted, multidisciplinary and hospital wide approach.[5] Another southern India study calculated patient per hour per provider (PPH). PPH per tier-1 physician was the highest, being 10.6 versus 5 ($P< 0.001$) in the morning and 7.2 versus 6.6 ($P = 0.08$) in the evening shifts on Sundays and other days, respectively.[6]

Admission time was more than 4 hours in approximately 22% (117/528 admissions) during the day hours and 15% during night hours (69/473 admissions). Thus, there is definite scope to improve the hospital services further and a follow up focused study is necessary to delineate rate limiting factors in the admission process. We could potentially think of following factors which could influence the admission time: Selective referrals, manpower (doctors, nurses, paramedicals, nursing orderlies), their qualification and experience, communication between health care workers and

patients, centralization of services i.e. all services available in vicinity, laboratory and radiology services availability and their turn around times, availability of drugs and medical consumables etc., support services like transportation etc., stressed by various studies.[7–10] A research from Western Africa (Burkina Faso), studied 2627 admissions [Adama]. Delays in management involved 216 patients (8.2%).[9] The referred patients accounted for 165 admissions (85.7%). The average waiting period between the arrival of a patient and the beginning of first aid was 2 hours and 23 minutes with extremes of 16 min and 546 min. The authors categorized the following reasons for the delays: Human resources (lack of support staff, unavailability of medical staff, reduced number of doctors on call); Organization of hospital service (ignorance of places, pharmaceutical depot, closing timings, queues); Infrastructure and equipment (unavailability of the operating room, lack of examination tables); Financial resources and consumables (lack of money, availability of drugs and consumables).[9] The authors called for review of health policies by authorities to improve overall health care.

The Obstetrics and Gynecology casualty of our hospital caters to a wide geographical region. The hospital serves patients as far as Uttar Pradesh, Bihar and Gujarat. The number of referred cases formed 25.6% of the total cases attended. The highest referrals were from the neighboring state Uttar Pradesh (26%). Although some patients may prefer our hospital because of its medical college stature, expertise and facilities it offers, looking to the larger number of referrals from the adjacent state, it is prudent to suggest that more equipped tertiary care hospitals in that state could help bridge this gap.

The profile of patients presented to the casualty varied. Of the admitted patients, more than 50% required admission in the high-risk labour room, approximately 25% in the low-risk labour room and remaining in the septic labour room. The percentage of severely sick patients requiring critical care admission care was overall low (0.9%) but a significant proportion (18.8%) required immediate surgical intervention. This finding calls for upgraded ward support with expert nursing and monitoring facilities to cater to the profile of high-risk patients.

We also analyzed the admission times with respect to the number of doctors, referral status, need for critical care unit admission and surgery. Although the time to admission was quantitatively less when more doctors were on duty (mean 161.4 minutes when 4 doctors were present versus 169.9 minutes when manned by 3 doctors), the overall difference was statistically non-significant. Similarly, the referral status of the patients did not significantly affect the admission time. The patients requiring critical care admission needed prior stabilization and clinical work up in form of sampling, laboratory investigations and imaging before shifting to the concerned unit and therefore the admission time increased (mean 205 minutes versus 163.9 minutes for non-critical patients). Likewise, patients with need of urgent surgery also required certain preparations (e.g. intravenous access, catheterization, blood sampling for cross match, preoperative work up, ultrasound etc.)/ stabilizations that somewhat increased their admission times. Previous studies have mentioned similar inferences.[2,11] An Australian study mentioned obstetric and gynecological rate as 2.2% of total emergency attendance recorded for a span of 2 years. Patients who were pregnant (40.7%) were more likely to be managed in compliance with the 4 hour rule (69%). The main barriers to compliance were incomplete examinations by emergency department staff; waiting for imaging and blood investigations; delays waiting for specialty review; and delays caused by initial review by surgical teams.[11]

Another aspect elucidated in the study was the time for admission for the three categories of labour room (high risk labour room, low risk labour room and septic labour room). Accordingly, the patients with signs of infection were shifted to septic labour room and those with any obstetric complication to the high-risk labour room. A closer look at the admission pattern reveals nearly 53% of the presenting patients (534/1001) were in the high-risk category. Nearly 22% (219/1001) had some signs of infection and therefore admitted to the septic labour room. A combined 75% admitted patients required intensive monitoring either because they were in the high-risk category or suffered some infection broadly highlights the patient profile the department of Obstetrics and Gynecology of a heavy loaded tertiary care hospital being served. Significant differences emerged between the admission times to high-risk labour room (mean 166.4 minutes) and septic labour room (178.8 minutes) compared to the low-risk labour room (146.6 minutes) ($p<0.05$). The same can be again be attributed to the clinical stabilization and work up required in the casualty prior to shifting the patients to the respective wards. The low-risk patients could be quickly shifted to the wards and therefore the admission time was minimal (less than 2.5 hours). Our findings resonated with previous literature on the subject.[12] In an African set up, the high-risk category was identified by presence of fetal pelvic size disproportion (24.3%) followed by hypertensive disorders of pregnancy (9.8%) and prior uterine scar (9.1%) and these had higher wait times compared to other patients. Another factor with longer wait times in this study included presentations during the night shift.[12]

We also correlated the mean admission time to total casualty footfall and admissions made in 24 hours. There was some indication that increased work load in the casualty department proportionately increased the admission time (R=0.77). The admission frequency also positively correlated with the admission time (R=0.38) albeit less strongly than the casualty foot fall. Thus, there were factors inherent to the casualty department and admissions to wards (i.e. labour rooms) which determined the admission time. This has important implication in terms of identification and improvements.

Conclusions

Despite heavy work load and receiving large number of referrals in Obstetrics and Gynaecology emergency department of tertiary care facility, the mean time from casualty arrival to ward admission was well within the 4 hours international standard i.e. 2.7 hours. The admission time during the day was slightly more than the night hours. The admission time was not significantly influenced by the number of casualty doctors, patient's referral status, requirement of critical care or surgical intervention. The overall percentage of severely sick patients requiring critical care admission was low (1%) but significant proportion (19%) required immediate surgical intervention. The Obstetrics and Gynecology casualty served as the medical care pathway for the sick and ailing patients of the region. Of the total patients attending the casualty, approximately 59% required further evaluation and admission. The study also analyzed the admission times in relation to the patient profile and their severity of illness. Approximately 53% of the presenting patients were admitted to the high-risk labour rooms. Nearly 22% had some signs of infection and therefore admitted to the septic labour room. High risk and patients with infection patients required stabilization and work up increasing the admission time to their respective wards. There was some indication that increased work load in the casualty department proportionately increased the admission time (R=0.77). The admission frequency also positively correlated with the admission time (R=0.38).

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Strengths

1. First of its kind study in a speciality department of a tertiary care government set up
2. Inferences based on large sample size
3. The outcome measure was taken as admission time which involves several departments (clinical, laboratory, imaging departments) as well as various procedural (nursing, paramedical and housekeeping) and administrative (registration) actions. It therefore serves a sensitive indicator of various hospital processes and outcomes .

Limitations

1. Limited time span of the study (4 months)
2. Convenience sample size
3. The various factors accounting for admission time could be interdependent and the same could not elicited as only univariate analysis was used.

Implications, recommendations, future research

The study provided a benchmark 'admission time (casualty department to labour wards)' for the Obstetrics and Gynecology department in a tertiary care government hospital, catering to large load of sick patients. It also provided a potential quality marker which could be serially monitored for the functioning of the departmental emergency. A follow up study delineating potential rate limiting factors in the admission process is suggested for further improvement.

Looking to the large number of referrals from the adjacent states, it is prudent to suggest that more equipped tertiary care hospitals in the vicinity could help strengthen mother and child services of the region. Our study also pointed out that there were factors inherent to the casualty department and the subsequent admission process contributing to the total admission time. Thus, there is definite scope to improve the hospital services by identifying them and taking action, if needed.

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Conflict of interest

None.

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