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Clinical outcomes of patients transported to the obstetric emergency department directly by ambulance and via inter-hospital transfer

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Abstract

The aim of this study was to investigate the characteristics of pregnant patients transported directly by ambulance or by transfer between hospitals to the obstetric emergency department. The study was conducted among patients aged 18 years and over who were presented to the obstetric emergency department by ambulance between January 2024 and June 2024. Patients were divided into two groups as direct admission and inter-hospital transfer. Demographic characteristics, triage categories, indications for transfer, hospitalisation rates and length of hospital stay were recorded. Data were statistically analysed. A total of 600 patients were included in the study. In the inter-hospital transfer group, the hospitalisation rate and mean length of stay were significantly higher than in the direct admission group (30% vs 15% and 7 days vs 3 days, respectively). The rate and length of stay of patients in the Code Red triage category were higher in the transfer group. The most common indication for transfer was the need for a specialist. The rate and length of stay for patients requiring intensive care were higher than for other indications of transfer. Inter-hospital transfer is an important factor that may affect patient outcomes in the obstetric emergency department. Transferred patients were found to be more likely to be hospitalised and to have a longer length of stay. Optimising the transfer process is essential to ensure patient safety and minimise adverse outcomes.

Keywords: Inter-hospital transfer, obstetric emergency department, patient outcomes, hospitalisation rate, length of stay

Introduction

Inter-hospital transfer (IHT) is an essential component of modern healthcare systems and plays a critical role in ensuring that patients receive the specialised care or resources they need [1]. These transfers are often necessary, especially in rural areas or for specialised cases [2]. However, the IHT process can be complex and pose several challenges in terms of patient safety, cost and clinical outcomes [3,4].

Pregnancy and childbirth play a crucial role in women's health [5]. Complications that can occur during these processes can pose serious risks to both maternal and infant health [6]. Emergency obstetric care is essential for the early diagnosis and treatment of these complications [5,7]. However, not all health facilities may be able to provide adequate emergency obstetric care [6,7]. In these cases, patients may need to be transferred to better-equipped centres [8]. IHT can be a life-saving intervention in such obstetric emergencies [9]. In obstetrics, IHTs are generally

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required for high-risk pregnancies, emergencies or deliveries that require specialist care [10]. Delays in transfer can have adverse effects on maternal and infant health, so optimising the transfer process is of paramount importance [11]. In recent years, there has been an increasing number of studies on the impact of IHT on patient outcomes [9,12,13]. These studies show that patients who have been transferred may have higher morbidity and mortality rates and longer hospital stays [14]. In addition, delays in transfer may increase the risk of complications and compromise patient safety [15].

Our hypothesis in this study was that pregnant IHT patients would be present with greater urgency and have more complications than pregnant patients presenting directly to the obstetric emergency department (OB-ED). Our aim in this study was to investigate whether there was a difference between the characteristics and outcomes of pregnant patients presenting directly to the OB-ED by ambulance and IHT patients.

Material and Methods

Study Design and Participants

This is a cross-sectional study retrospectively reviewing pregnant patients brought to Ankara Etlik City Hospital OB-ED by Ankara 112 Emergency Healthcare Services ambulances between 1 January and 30 June 2024. Prior to the study, approval was obtained from the Clinical Research Ethics Committee of Bilkent City Hospital, Health Sciences University (date: 22.01.2024, number: 259874). The study population included approximately 881 pregnant patients over 18 years of age who were registered in the Ankara 112 Emergency Health Services ASOS system and transferred to the OB-ED of Ankara Etlik City Hospital. Pregnant patients who presented to Ankara Etlik City Hospital OB-ED by other means, were under 18 years of age or were transferred from another hospital by private ambulance; patients with non-pregnancy related gynaecological complaints and cases with missing pre-hospital or hospital data were excluded from the study.

Study Protocol and Data Collection

Patients with pregnancy-related complaints were assessed in the OB-ED and standard diagnostic and management protocols (monitoring, haemodynamic support, fluid, NST, USG) were applied. Patients in labour were taken to the delivery room and assessed by the obstetrician for either caesarean section or normal delivery. Patients who would have a normal delivery were followed up in the delivery room. Patients requiring emergency caesarean section were operated on. Demographic data, clinical characteristics, hospitalisation status and laboratory data of these patients were obtained from the hospital's medical database, and pre-hospital data such as response time of the 112 Control Centre, ambulance response and arrival times, vital interventions performed at first contact with pre-hospital emergency medical services, and arrival time of the patient at the hospital were

obtained from the 112 Emergency Healthcare Automated System (ASOS) system.

Statistical Analysis

The data in our study were analysed using IBM SPSS 27.0 software (Armonk, NY: IBM Corp.). Study variables were identified as frequency, percentage, mean, standard deviation, median, min-max and IQR. The chi-squared (χ^2) test was used to compare qualitative data. The distribution of the data was assessed using the Kolmogorov-Smirnov test, skewness and kurtosis, and graphical methods (histogram, Q-Q plot, StemandLeaf, boxplot). Independent Samples t-test (t-test in independent groups) was used for data with normal distribution, and Mann-Whitney U test was used for data with non-normal distribution. Logistic regression (binary logistic regression) test was used to determine the risk ratios of the variables, and receiver operating characteristic (ROC) analysis was performed to calculate the sensitivity and specificity and to determine the optimal cut-off values. The statistical significance level was accepted as $\alpha=0.05$.

Results

Of the 881 pregnant patients enrolled in the study, a total of 281 patients who did not meet the study criteria (35 patients under 18 years of age, 73 patients who arrived by private ambulance, 76 patients with non-pregnancy related gynaecological complaints, and 97 patients with missing data) were excluded from the study, and 600 patients were included. The mean age of the obstetric emergencies included in the study was 28.6 ± 8.4 years. While patients admitted by IHT consisted 38.5% ($n=231$) of the cases, patients presenting directly to OB-ED by ambulance consisted 61.5% ($n=369$). The rate of presentation from urban areas was 96.5% ($n=579$) and 69.7% ($n=418$) of cases were from the hospital's service area. Demographic and presentation characteristics of obstetric emergencies admitted to OB-ED are shown in Table 1.

The most common reason for IHT was the need for a specialist with 71.4% ($n=165$), followed by the need for intensive care with 19.0% ($n=44$) and the need for medical equipment with 5.6% ($n=13$). The hospital admission rate (97.7%) and mean length of stay (4.2 ± 9.8 days) were significantly higher in patients transferred for critical care needs compared to other indications for transfer ($p<0.001$). Indications for transfer and clinical outcomes of the pregnant patients included in the study are shown in Table 2.

The hospitalisation rate (93.5% vs 89.4%, $p=0.041$) and mean length of stay (3.4 ± 9.1 vs 2.6 ± 8.4 days, $p=0.038$) were significantly higher in the IHT group compared to the direct admission group. This difference was more pronounced in patients in the Code Red triage category (hospitalisation rate: 97.2% vs. 94.6%, $p=0.031$; length of stay: 4.5 ± 10.2 vs. 3.8 ± 9.4 days, $p=0.028$). Clinical outcomes of patients according to triage codes are shown in Table 3.

Table 1. Demographic and presentation characteristics of obstetric emergency cases

Characteristic	Inter-hospital transfer (n=231)	Direct admission (n=369)	p value
Age (year)*	29.2±8.7	28.2±8.2	0.156
Urban/rural			0.042
Urban	228 (98.7)	351 (95.1)	
Rural	3 (1.3)	18 (4.9)	
Service area			<0.001
Inside	134 (58.0)	284 (77.0)	
Outside	97 (42.0)	85 (23.0)	
Time of presentation			0.183
During working hours	97 (42.0)	175 (47.4)	
Outside of working hours	134 (58.0)	194 (52.6)	

*Values are given as mean±standard deviation

Table 2. Clinical outcomes according to transfer indications

Indication for transfer	n (%)	Hospitalisation rate (%)	Length of stay (day)	Code red (%)	p value†
Need for specialist	165 (71.4)	94.5	3.6±9.2	13.3	0.042
Need for intensive care	44 (19.0)	97.7	4.2±9.8	27.3	<0.001
Need for medical equipment	13 (5.6)	92.3	3.1±8.6	15.4	0.156
No vacancy	9 (3.9)	88.9	2.8±7.9	11.1	0.342

* Values are given as mean±standard deviation; † p values were calculated for hospitalisation rate and duration compared with other indications

Table 3. Clinical outcomes according to triage categories

Triage category	Inter-hospital transfer (n=231)	Direct admission (n=369)	p value
Code red			
n (%)	36 (15.6)	37 (10.0)	0.043
Rate of hospitalisation (%)	97.2	94.6	0.031
Length of stay (day)*	4.5±10.2	3.8±9.4	0.028
Code yellow			
n (%)	155 (67.1)	231 (62.6)	0.271
Rate of hospitalisation (%)	93.5	89.2	0.045
Length of stay (day)*	3.2±8.9	2.5±8.2	0.039
Code green			
n (%)	40 (17.3)	101 (27.4)	0.005
Rate of hospitalisation (%)	90.0	86.1	0.183
Length of stay (day)*	2.6±7.8	2.2±7.4	0.241

* Values are given as mean±standard deviation

Discussion

This retrospective study evaluated the characteristics and clinical outcomes of pregnant patients presented directly by ambulance or via IHT to the OB-ED and found that pregnant patients presenting via IHT had longer ICU and ward stays (4.2±9.8, 3.4±9.1 days, respectively) and more complications. In a study by Limmer et al, inter-hospital transfer of patients who underwent emergency abdominal surgery were shown to cause delays in surgery and prolonged hospital stay [11]. In our study, we also found that pregnant patients presenting via IHT had more hospital admissions than others. It is thought that a similar

situation may be occurring in maternal care and that delays in transfer may have adverse effects on maternal and infant health. Particularly in cases requiring emergency caesarean section, delays due to transfer can have critical consequences. Therefore, it is important to implement the guidelines developed for the transfer of emergency surgical patients to maternal care and to expedite the transfer process, as suggested by Wong et al. [15]. Our study also found that the rate and duration of hospitalisation for patients in the Code Red triage category was higher in the IHT group. This finding suggests that IHT patients are in a more critical condition and therefore require a longer hospital stay. This

finding is also supported by Mueller et al, who examined patients requiring intensive care and found that patients were more likely to experience adverse outcomes if they were transferred late at night or at weekends [9]. This may be due to the fact that hospital resources and staffing are more limited at night and at weekends. Similar challenges may arise in the transfer of Code Red patients in maternal care, potentially leading to adverse patient outcomes. In a review of trauma patients, Hill et al reported that inter-hospital transfers did not increase mortality, but that there was significant heterogeneity between studies [13]. This heterogeneity may be due to differences in patient populations, working environments and assessed outcomes. The transport of Code Red patients in maternal care may present different challenges and risks compared to trauma patients.

Another important finding of our study was that the most common indication for transfer in the IHT group was the need for a specialist. This may be an indicator of consultant shortages, particularly in rural hospitals. In a study of emergency departments in California, Menchine et al. found that specialists' call rates and ability to transfer patients to higher levels of care deteriorated after the 2003 EMTALA final rule [2]. A shortage of specialists may require patients to be transferred to better-equipped centres, which may pose additional risks. Huntington et al. showed that the number of transfers of surgical patients increased and that patients who were transferred had higher morbidity and mortality rates than those who were not transferred [3]. This study suggests that surgical specialisation and physician stratification may complicate future transfer practices. A shortage of obstetric specialists and increasing numbers of transfers may have a negative impact on patient outcomes in maternal care also.

Standardisation and improvement studies should be carried out to minimise delays in the inter-hospital transfer process and ensure patient safety. In their study, Reichheld et al. defined best practices in IHT and identified opportunities for improvement in the transfer process [1]. The study identified six critical elements, including initiation of patient transfer requests; management of transfer requests and information exchange; updates between transfer acceptance and patient transfer; transfer; patient admission and access to information; and measurement, evaluation and feedback. Standardisation and improvement of these elements can increase the safety of inter-hospital transfers and improve patient outcomes. Mueller et al. highlighted the need for standards in IHTs [16]. Standardisation and continuous evaluation of the transfer process in maternal care is important for patient safety and clinical outcomes.

The results of our study suggest that inter-hospital transfers play an important role in maternal care and can affect patient outcomes. Delays in transfer can pose significant challenges in terms of patient safety and clinical outcomes. Careful evaluation and optimisation of the transfer process is required, particularly when transferring critical patients. In a study conducted in the USA, Philip et al found that transfer of emergency general surgery patients increased in-hospital morbidity and mortality,

length of stay and costs [4]. This study highlights the burden that IHTs place on the health care system and their negative impact on patient outcomes in general surgery patients. Inadequate hospital resources and the need for transport in cases requiring specialisation may be among the factors contributing to these negative outcomes. It is believed that similar problems may occur in maternal care and that the transfer process should be managed carefully.

Our study has several limitations. The first is that it is a single centre study and the results cannot be generalised because patients from other centres were not included. Secondly, because of the retrospective design of the study, long-term clinical status of the mother and infant is not known. Finally, because it was not known whether the pregnant patient had previous high-risk pregnancies, we could not exclude them, and this may have altered our patient outcomes.

Conclusion

In conclusion, inter-hospital transfers are an important factor that can affect patient outcomes in maternal care. Transferred patients were found to be more likely to be admitted to hospital and to have a longer length of stay. In addition, in the IHT group, a higher proportion of patients in the Code Red triage category and those requiring intensive care were admitted to hospital and stayed longer. Optimising the transfer process is essential to ensure patient safety and minimise adverse outcomes. In our study, the most common indication for transfer was lack of specialist. In order to reduce transfers and provide more effective maternal and infant care, measures such as developing inter-hospital transfer policies, speeding up and standardising the transfer process, addressing the shortage of specialists, and minimising delays that may occur during transfer should be taken. Future multicentre trials will be useful to assess the effectiveness of these recommendations.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

Ethics committee approval was obtained from the Clinical Research Ethics Committee of Ankara Bilkent City Hospital with the approval number E2-259874 on January 22, 2025.

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