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CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF INTERHOSPITAL TRANSFERS TO A TERTIARY CARE CENTER

HASTANELER ARASI TRANSFERLERİN KLİNİK VE EPİDEMİYOLOJİK ÖZELLİKLERİ

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ABSTRACT

Introduction: This study aimed to describe the demographic, clinical, and geographical characteristics of interhospital transfers (IHT) to a tertiary care center, to identify differences among transfer types, and to examine temporal trends in transfer patterns. In our study, we aimed to evaluate the effect of platelet-rich plasma (PRP) obtained from autologous blood on rabbit intra-tunnel tendon bone healing using biomechanical and histologic parameters.

Methods: Patients who were admitted through IHT between January 1, 2021, and May 31, 2025, from Eskişehir and neighboring provinces were retrospectively analyzed. Demographic variables, referring province, transfer type, and diagnostic categories were obtained from the Hospital Information System. Incomplete or duplicate records were excluded. Categorical variables were compared using the chi-square test, with a p-value of <0.05 considered statistically significant.

Results: Of the 3,280 patients included, 60% were male, with a mean age of 51±27 years. Adults accounted for 83.8% and pediatric patients for 16.2%. Most transfers originated from Eskişehir (n=1,547). The total number of transfers decreased over the study period; intraprovincial transfers predominated in 2021, while interprovincial transfers increased in subsequent years (p=0.001). Intensive care (42.7%) and emergency (41.1%) were the most frequent transfer types; ICU transfers were more common intraprovincially, whereas emergency transfers predominated interprovincially (p < 0.001). The most common diagnostic categories were cardiovascular (17.0%), respiratory (13.0%), and neurological diseases (7.9%).

Conclusions: Clinical needs, along with organizational and geographical factors, influence interhospital transfer processes. Safe and effective transfer management requires strengthening coordination, ensuring patient stabilization, and improving information exchange. Multicenter prospective studies are needed to further elucidate the impact of transfer practices on patient outcomes.

Keywords: Interhospital transfer; Transfer types; Health care organization.

ÖZET

Giriş: Bu çalışmanın amacı, üçüncü basamak bir sağlık merkezine yapılan hastaneler arası transferlerin demografik, klinik ve coğrafi özelliklerini tanımlamak, transfer türleri arasındaki farklılıkları belirlemek ve yıllara göre değişen transfer eğilimlerini ortaya koymaktır.

Yöntemler: 1 Ocak 2021–31 Mayıs 2025 tarihleri arasında Eskişehir ve çevre illerden hastaneler arası transfer yoluyla kabul edilen hastalar geriye dönük olarak incelendi. Demografik veriler, sevk ili, transfer türü ve tanı grupları Hastane Bilgi Yönetim Sistemi'nden elde edildi; eksik veya yinelenen kayıtlar dışlandı. Kategorik değişkenler ki-kare testi ile karşılaştırıldı (p<0,05).

Bulgular: Toplam 3.280 hastanın %60'ı erkekti; yaş ortalaması 51±27 yıldı. Erişkin olgular %83,8, pediatrik olgular %16,2 oranındaydı. En sık transfer Eskişehir'den yapıldı (n=1.547). Yıllar içinde toplam transfer sayısı azaldı; 2021'de il içi transferler baskınken, sonraki yıllarda il dışı transfer oranı arttı (p=0,001). Transfer türleri arasında yoğun bakım (%42,7) ve acil servis (%41,1) önde yer aldı; il içi sevklerde yoğun bakım, il dışı sevklerde ise acil başvurular daha yüksek bulundu (p<0,001). En yaygın tanılar kardiyovasküler (%17,0), solunum sistemi (%13,0) ve nörolojik hastalıklardı (%7,9).

Sonuç: Klinik ihtiyaçlar, organizasyonel ve coğrafi faktörlerle birlikte hastaneler arası transfer süreçlerini etkiler. Güvenli ve etkili transfer yönetimi, koordinasyonun güçlendirilmesini, hasta stabilizasyonunun sağlanmasını ve bilgi alışverişinin iyileştirilmesini gerektirir. Çok merkezli ve prospektif çalışmalar, transfer uygulamalarının hasta sonuçları üzerindeki etkilerini daha ayrıntılı biçimde ortaya koyacaktır.

Anahtar Kelimeler: Hastaneler arası transfer; Transfer türleri; Sağlık hizmeti organizasyonu

INTRODUCTION

In modern healthcare systems, the continuity and quality of patient care depend not only on the resources of individual institutions but also on the efficiency of referral mechanisms established between them. In this context, interhospital transfers (IHT) play a critical role in tertiary healthcare services by enabling access to advanced diagnostic and therapeutic interventions. Beyond individual patient benefit, IHT contributes to the overall functionality of the healthcare system, enhancing resource utilization efficiency and the sustainability of service delivery (1). Transfer decisions are typically made when diagnostic or therapeutic procedures

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cannot be completed at the referring institution or when the case requires advanced investigations or specialized expertise. Common indications include the need for advanced evaluation in fields such as cardiology or neurology, surgical planning, admission to intensive care units, referral to specialized units, or access to advanced imaging and therapeutic modalities (2). Moreover, during extraordinary circumstances such as pandemics, natural disasters, or mass-casualty incidents, interhospital transfers hold strategic importance in balancing patient load and ensuring equitable distribution of healthcare services (1).

In Türkiye, studies have reported that 10–35% of transfers performed within the scope of the 112 Emergency Medical Services involve interhospital transfers (3), indicating that IHT has become a widespread and systematic practice nationwide. Although transfer decisions are primarily based on clinical indications, administrative factors or multidisciplinary physician consultations may also influence the process in some cases (4,5).

International data reveal similar patterns. For example, in Australia, the IHT rate has been reported to be below 5%, with most transfers occurring from rural areas to metropolitan centers (6,7). This findind has been attributed to limited access to specialized services, infrastructural constraints, and imbalanced distribution of healthcare personnel in rural regions (8). The increasing subspecialization in medicine and advances in medical technology have further amplified the demand for specialized services, thereby intensifying the need for interhospital transfers (9).

Nevertheless, IHTs may adversely affect clinical outcomes—particularly among critically ill patients—due to challenges such as time constraints, difficulties in maintaining patient stabilization, limited availability of appropriate ambulance teams and equipment, communication gaps, and inadequate transfer documentation.

In this study, interhospital transfers to a tertiary healthcare center were retrospectively analyzed in terms of their frequency, underlying causes, patient characteristics, and fundamental process features. The findings are expected to contribute to the optimization of IHT management and to the development of future healthcare service policies.

The aim of this study is to describe the demographic, clinical, and geographical characteristics of interhospital transfers to a tertiary care center, to identify differences among transfer types, and to explore potential trends associated with regional healthcare dynamics.

METHODS

Study Design and Scope

This study was designed as a retrospective descriptive analysis. The study population consisted of all patients who were officially referred to Eskişehir City Hospital between January 1, 2021, and May 31, 2025, and whose complete medical records were accessible.

Inclusion and Exclusion Criteria

Patients who were admitted through interhospital transfer during the specified period and had complete demographic, clinical, and diagnostic data available in the Hospital Information Management System (HIMS) were included in the study.

Patients who were transferred outside the study period, had incomplete, duplicated, or erroneous entries in the HIMS, or did not comply with official medical referral protocols—such as transfers initiated at the request of the patient or family, lacking formal referral documentation or physician approval, or being administratively misclassified—were excluded from the analysis.

Ethical Approval

The study was approved by the Ethics Committee of Eskişehir City Hospital on May 22, 2025 (Decision No. 2025/174). All procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Patient data were obtained exclusively from the hospital information management system, and all personal identifiers were anonymized to ensure confidentiality.

Data Sources and Variables

All data were retrospectively retrieved from the HIMS archive. Demographic variables included age, sex, and age group (pediatric: 0–17 years; adult: ≥18 years). Geographical data covered the provinces from which patients were transferred, with detailed analysis of the most frequent referral regions. Clinical data were analyzed according to admitting units, including emergency departments, pediatric wards, intensive care units, and burn units. Diagnostic data were categorized as cardiovascular, respiratory, neurological, psychiatric, orthopedic, COVID-19–related, burn or corrosive injuries, neonatal, general surgical, and gastrointestinal conditions.

Statistical Analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 27.0 (IBM Corp., Armonk, NY, USA). Both descriptive and comparative statistical methods were applied. Continuous variables were expressed as mean ± standard deviation (SD) or median (minimum–maximum), whereas categorical variables were presented as frequencies and percentages. The Mann–Whitney U test was used to compare the number of admitted patients and the proportions of intra- and interprovincial transfers across the years. A p-value of <0.05 was considered statistically significant in all analyses.

RESULTS

Interhospital transfers to tertiary care centers between 2021 and 2025 were analyzed. The annual distribution of admissions, the proportions of intra- and interprovincial transfers, and the demographic, clinical, and diagnostic characteristics of the patients were evaluated in detail.

The total number of admitted patients and the corresponding intra- and interprovincial transfer rates for each year are summarized in Table 1. The highest number of admissions was recorded in 2021 (n = 1,100), followed by a gradual decline in subsequent years. The total number of interhospital transfers demonstrated a gradual decline throughout the study period, with the highest number recorded in 2021. This downward trend is illustrated in Figure 1. The 2025 data represent only the first five months, including 136 admissions. With respect to the source of referral, intraprovincial transfers predominated in 2021 (52.9%), whereas interprovincial transfers progressively increased in later years, reaching approximately 57–58% in 2023 and 2024. The inter-year differences were statistically significant (p = 0.001) (Table 1).

Of the 3,280 patients included in the study, 60% were male and 40% female, with a mean age of 51 ± 27 years. Adults constituted 83.8% of the cohort, while 16.2% were pediatric cases. Among interprovincial centers, the most frequent referring provinces were Bilecik, Afyon, and Kütahya. However, when all transfers were considered, the

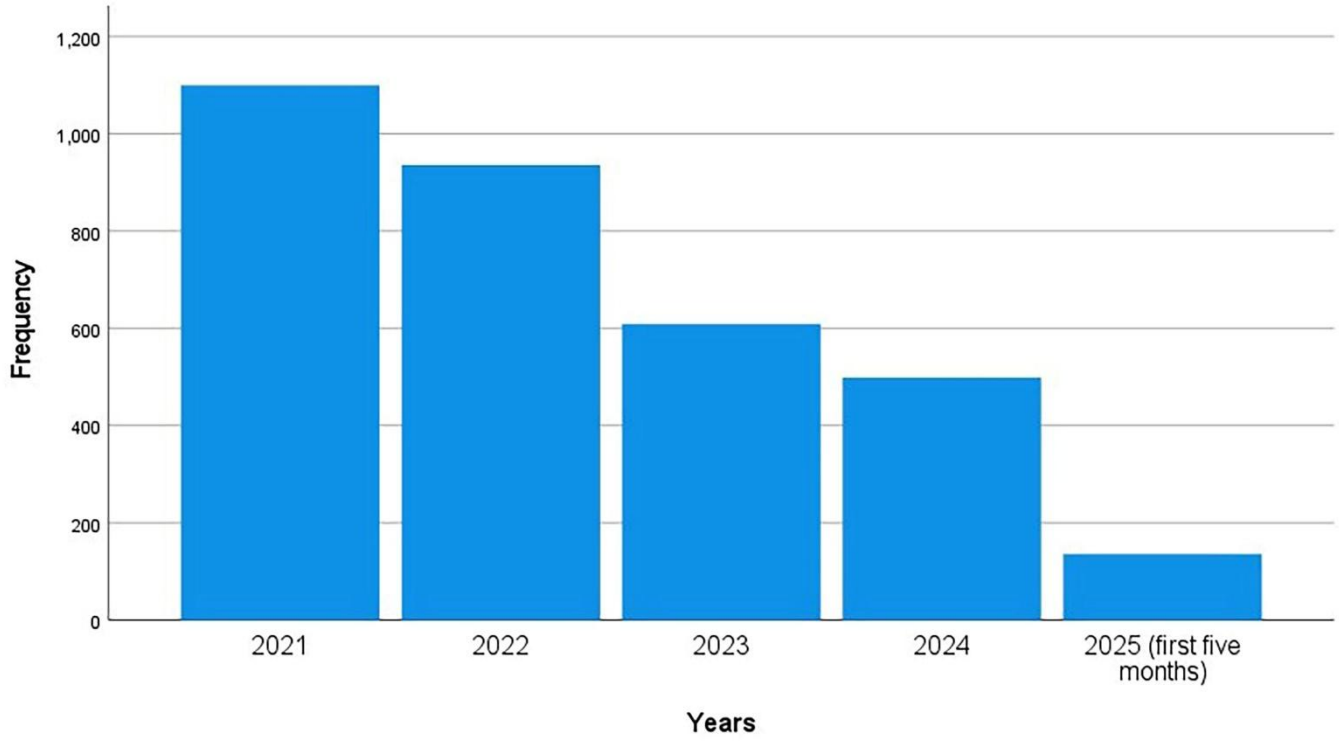

Figure 1 *Annual distribution of interhospital transfer cases (2021–2025)*

highest number of admissions originated from within Eskişehir province (n = 1,547) (Table 2).

Regarding transfer types, intensive care unit (ICU) transfers represented the most common category (Table 3), followed by emergency transfers (41.1%) and ward transfers (12.4%). The majority of intraprovincial transfers were directed to ICUs (62.8%), whereas interprovincial transfers most frequently involved emergency cases (55%). This difference was statistically significant ($p < 0.001$).

When diagnostic categories were examined, cardiovascular diseases (17.0%) were identified as the leading cause of transfer, followed by respiratory diseases (13.0%), neurological disorders (7.9%), psychiatric conditions (7.2%), and musculoskeletal disorders (6.5%). COVID-19 cases (6.3%) and burn/corrosive injuries (6.2%) also accounted for a considerable proportion of transfers. Lower frequencies were observed for neonatal, general surgical, and gastrointestinal indications, reflecting the broad clinical spectrum encompassed by interhospital transfers (Figure 2).

DISCUSSION

This study provides comprehensive data on the dynamics of interhospital transfers (IHT) to tertiary care centers between 2021 and 2025 by analyzing their demographic, clinical, geographical, and diagnostic characteristics. The findings are largely consistent with the existing literature, while also highlighting several noteworthy trends specific to

Table 1 *Annual distribution of patients admitted through interhospital ambulance transfers*

Year	Number of patients	Intraprovincial	Interprovincial	p*
2021	**1100**	**582**	**518**	**0.001**
2022	**936**	**437**	**499**	
2023	**609**	**252**	**357**	
2024	**499**	**213**	**286**	
2025 (first five months)	**136**	**63**	**73**	

***** *The Mann–Whitney U test was applied*

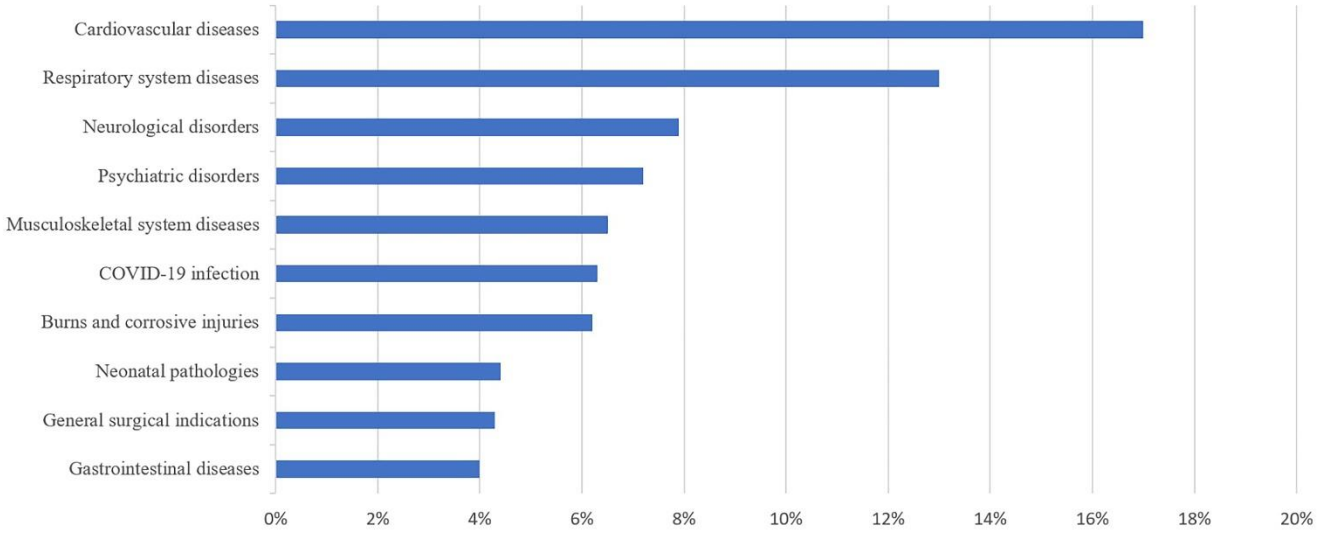

Figure 2 *Distribution of the most common diagnostic categories among transferred patients*

regional healthcare service patterns. We observed a gradual decrease in the total number of annual admissions starting from 2021. This trend may be attributed to possible changes in healthcare organization during the post-pandemic period, revisions in patient referral algorithms, or the implementation of policies aimed at reducing the workload of tertiary centers. However, since the available data did not directly demonstrate this association, we should consider it a potential explanation rather than a definitive conclusion. Additionally, while intraprovincial transfers were more common in 2021, interprovincial transfers increased in the following years. This pattern may suggest an increasing dependence of neighboring provinces on tertiary care services and a strengthening of regional healthcare integration. Consistent with our findings, previous studies have also reported higher transfer rates from rural areas to metropolitan centers (6,8).

The demographic characteristics of the included patients revealed that males accounted for 60% of the study population, with a mean age of 51 years. This finding aligns with the demographic distributions reported in earlier studies (2). The proportion of pediatric patients was 16.2%, indicating that tertiary healthcare transfers predominantly involved adult populations. The fact that most referrals originated from Eskişehir, followed by Bilecik, Afyon, and Kütahya, underscores the strong demand for advanced healthcare services within the province where the tertiary center is located.

When the types of transfers were examined, intensive care unit (ICU) transfers (42.7%) and emergency transfers (41.1%) were found to be predominant. The higher proportion of ICU transfers within the province reflects the utilization of regional critical care capacity, whereas the predominance of emergency transfers among interprovincial cases indicates an urgent need for tertiary-level interventions in time-sensitive conditions. These findings emphasize the crucial importance of coordination, effective communication, and the timely availability of properly equipped and trained transfer teams in ensuring safe and efficient patient transport (5).

The diagnostic distribution showed that cardiovascular diseases (17.0%) were the leading cause of transfer, which is consistent with the global pattern where cardiovascular

Table 2. *Distribution of patients by sex, age, and referral provinces*

Variable	Patients, n (%) / Mean ± SD
Male gender	1967 (60%)
Age (years)	51 ± 27
Adult (≥18 years)	2750 (83.8%)
Referral province	
Within-province (Eskişehir hospitals)	1547
Bilecik	866
Afyon	336
Kütahya	256
Uşak	66

diseases remain a major cause of morbidity and mortality (1). The relatively high proportion of respiratory,

neurological, and psychiatric conditions further illustrates the multidisciplinary spectrum of tertiary healthcare centers. The notable presence of COVID-19 cases and burn/corrosive injuries partly reflects the overlap of the study period with the pandemic and the continued referral of acute traumatic cases. Collectively, these findings indicate that interhospital transfers are shaped not only by clinical requirements but also by systemic, geographical, and resource-related determinants of healthcare delivery.

Looking ahead, ensuring patient stabilization during transfer, strengthening communication chains before and after referral, maintaining the adequacy of transfer teams and equipment, and addressing information gaps should be prioritized within healthcare policy frameworks (5,9). Enhancing regional healthcare networks and promoting equitable distribution of intensive (critical) care capacity are of strategic importance in improving system resilience. In line with this perspective, the 2023 World Health Assembly Resolution WHA 76.2 of the World Health Organization emphasized the integration of emergency, critical, and

Table 3. *Most common types of transfers among referred patients*

	Total n (%)	Intraprovincial n (%)	Interprovincial n (%)	p value*
Emergency Department	1348 (41.1%)	395 (25.5%)	953 (55%)	<0.001
Intensive care unit	1401 (42.7%)	971 (62.8%)	430 (24.8%)	
Ward	407 (12.4%)	106 (6.9%)	301 (17.4%)	
Consultation	53 (1.6%)	44 (2.8%)	9 (0.5%)	
Palliative care unit	12 (0.4%)	4 (0.3%)	8 (0.5%)	
Medical investigation	59 (1.8%)	27 (1.7%)	32 (1.8%)	

**The Kruskal–Wallis H test was performed.*

operative care into national health systems as a key policy action to improve patient safety and optimize resource utilization (10).

Limitations

This study has several limitations. First, the analysis was based on data obtained from a single center; therefore, the findings may not be generalizable to all regions. Additionally, due to the retrospective design, some variables that could have influenced referral decisions or clinical outcomes may have been incomplete or inadequately recorded. Since the study primarily aimed to describe the demographic, geographical, and epidemiological characteristics of interhospital transfers, clinical outcome parameters such as mortality, length of hospital stay, or complication rates were not evaluated. This represents a major limitation of the study. Future prospective, multicenter investigations are expected to enable interregional comparisons and provide a more detailed assessment of the impact of transfer practices on patient prognosis.

CONCLUSION

In This study provides a detailed analysis of interhospital transfers to a tertiary care center between 2021 and 2025, offering novel insights into regional transfer dynamics. The findings indicate that differences in transfer types and diagnostic distributions should be taken into account in healthcare service planning. By demonstrating that transfer processes are influenced not only by clinical requirements but also by institutional and geographical factors, this study serves as a solid reference point for future multicenter and prospective research.

Ethics Committee Approval

The study was approved by the Ethics Committee of Eskişehir City Hospital on May 22, 2025 (Decision No. 2025/174). All procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Patient data were obtained exclusively from the hospital information management system, and all personal identifiers were anonymized to ensure confidentiality

Informed Consent: Informed consent was not required due to the retrospective nature of the study.

Author Contributions

The contributions of the authors to this study were as follows: The conception of the idea, development of the hypothesis, planning of the methodology, and overall supervision of the project were undertaken by Uğur Kahveci. Data collection, patient follow-up, data processing, and reporting were performed by Emrah Arı. Analysis and interpretation of the results, as well as the literature review, were conducted by Emrah Arı. The manuscript was written jointly by Uğur Kahveci and Emrah Arı, and its critical revision for intellectual content and final approval for publication were carried out by both authors.

Conflict of interest: The authors declare no conflict of interest.

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