ORIGINAL RESEARCH

Bagcilar Med Bull 2025;10(2):149-152
DOI: 10.4274/BMB.galenos.2025.00719

Assessment of Disease Codes Reliability in Emergency Department Patients

Acil Servise Başvuran Hastalarda Tanı Kodlarının Güvenilirliğinin Araştırılması

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Abstract

Objective: In modern times, data obtained through international classification of diseases (ICD) codes from hospital automation systems are frequently used in studies on epidemiology, surveillance, and survival. The reliability of these data is critically important for the accuracy of the studies. This study aims to investigate the accuracy of emergency department diagnoses for patients who requested urology consultations and to reveal their reliability.

Method: Records of patients who requested urology consultations after presenting to the emergency department within the past year were retrospectively screened through the hospital automation system. The green, yellow, and red zone presentations were classified according to the time of day, and the compatibility of the patients' emergency diagnoses with the diagnoses in the urology clinic was evaluated.

Results: A total of 2.197 patients [1.660 (75.56%) men and 537 (24.44%) women] with an average age of 50.59±23.10 (range: 1-98) years, who requested urology consultations in the emergency department, were included in the study. Of the patients seen in the urology clinic, 637 (28.99%) were referred from the green zone, 703 (32.04%) from the yellow zone, 221 (10.10%) from the red zone, and 636 (28.86%) from other branches. Of the patients, 1.623 (73.87%) presented between 08:00 and 16:00, 406 (18.48%) between 16:00 and 00:00, and 168 (7.64%) between 00:00 and 08:00.

Öz

Amaç: Günümüzde epidemiyoloji, sürveyans ve sağkalım gibi çalışmalarda sıklıkla hastane otomasyon sistemleri üzerinden uluslararası hastalık tanı sınıflandırma (ICD) kodları kullanılarak elde edilen veriler kullanılmaktadır. Bu verilerin güvenilirliği çalışmaların doğruluğu açısından ciddi önem taşımaktadır. Bu çalışmada acil servis başvurusunda üroloji konsültasyonu istenen hastaların acil servis tanılarının doğruluğunu araştırarak güvenilirliklerini ortaya koymayı amaçladık.

Yöntem: Hastane otomasyon sistemi üzerinden son bir yıl içinde acil servis başvurusu sonrası üroloji konsültasyonu istenen hastalarının kayıtları geriye dönük olarak tarandı. Yeşil, sarı ve kırmızı alan başvuruları gün içindeki başvuru zamanına göre tasnif edilerek hastaların acil tanıları ile üroloji polikliniğindeki tanılarının uyumu değerlendirildi.

Bulgular: Acil servis başvurusunda üroloji konsültasyonu istenen, ortalama yaşı 50,59±23,10 (1-98 arası) yıl olan toplam 2,197 hasta [1,660 (%75,56) erkek ve 537 (%24,44) kadın] çalışmaya dahil edildi. Üroloji polikliniğinde görülen hastaların 637'si (%28,99) yeşil alandan, 703'ü (%32,04) sarı alandan, 221'i (%10,10) kırmızı alandan ve 636'sı (28,86) diğer branşlardan yönlendirilmişti. Hastaların 1623'ü (%73,87) saat 08:00-16:00 arası, 406'sı (%18,48) 16:00-00:00 arası ve 168'i (%7,64) 00:00-08:00 arasında başvurmuştu. Üroloji konsültasyon isteklerindeki hasta ICD kodları ile ürolojik değerlendirme sonrası hastaların aldıkları ICD kodları

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Received: 04.08.2024 **Accepted:** 21.02.2025 **Epub:** 21.02.2025 **Publication Date:** 24.06.2025

Cite this article as: Gönültaş S, Kardaş S, Köse MG, Gelmiş M, Sulejman S, Süzan S, et al. Assessment of disease codes reliability in emergency department patients. Bagcilar Med Bull. 2025;10(2):149-152

***One of the authors of this article (A.Y.M.) is a member of the Editorial Board of this journal. He was completely blinded to the peer review process of the article.**

The ICD codes of patients who requested urology consultations were found to have statistically significant compatibility with the ICD codes of patients after urological evaluation (kappa: 0.863, p<0.05). This significant compatibility was also observed in the evaluations classified based on the unit and hours of consultation requests.

Conclusion: The reliability of diagnosis codes is high even in high-volume areas like emergency departments. These results have inspired the creation of secure databases that will provide a source for diagnosis code-based studies in our country.

Keywords: Emergency department, International classification of diseases code, national database, renal colic

istatistiksel olarak anlamlı derecede uyumlu saptanmıştır (kappa: 0,863, p<0,05). Konsültasyon atılan birim ve konsültasyon atılan saatler göz önüne alınarak yapılan sınıflandırılmış değerlendirmelerde de anlamlı uyumluluğun devam ettiği görülmüştür.

Sonuç: Tanı kodu güvenilirliği acil servis gibi yüksek yoğunluklu hasta başvurusu olan alanlarda dahi yüksektir. Bu sonuçlar ülkemizde tanı koduna dayalı çalışmaların yapılmasına kaynak sağlayacak güvenli veri tabanlarının oluşturulmasına ilham vermiştir.

Anahtar kelimeler: Acil servis, renal kolik, ulusal veri tabanı, uluslararası hastalık tanı sınıflandırma kodu

Introduction

For more than a century, the international classification of diseases (ICD) has had a wide range of global uses. Through data reported and coded with ICD, critical information on the scope, causes, and consequences of diseases and deaths is provided globally (1,2). The statistics obtained from these data support service planning, quality and safety management, healthcare research, and payment systems (2). Therefore, the reliability of the data is critically important. Problems in data entry due to excessive workload, insufficient staff, or lack of experience threaten data reliability. There is no study in our country testing the reliability of these data that will provide a source for the planned national database application. In this study, we aimed to assess the reliability of emergency department diagnoses by investigating the accuracy of diagnoses of presenting patients where high-intensity service delivery occurs.

Materials and Methods

After obtaining data usage permission from the Local Ethics Committee (University of Health Sciences Turkey, Gaziosmanpaşa Training and Research Hospital Clinical Research Ethics Committee, date: 16.08.2023, no: 118), records of patients who requested urology consultations after presenting to the emergency department within the past year prior to the approval date were retrospectively screened through the hospital automation system (Sarus® Hospital Information System, Technoritma Software Services Inc., Ankara, Turkey). The records were classified separately as emergency area presentations in the categories of green, yellow, red, and other (internal medicine, surgery, pediatrics), taking into account the time of day. Data such as age, gender, and the ICD codes entered in the consultation request and response were recorded separately. The compatibility of the patients' emergency department diagnoses by the triage physician with the diagnoses made after further examination and evaluation in the urology clinic was evaluated.

Statistical Analysis

In this study, statistical analyses were performed using the NCSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA) package. In addition to descriptive statistical methods (mean, standard deviation), the compatibility between the groups was evaluated using Cohen's kappa analysis. The results were evaluated at a significance level of p<0.05.

Results

In the past year, urology consultation requests were made for 2.218 patients from emergency areas, but urology consultations were not conducted for 21 patients. A total of 2.197 patients [1.660 (75.56%) men and 537 (24.44%) women] with an average age of 50.59±23.10 (range: 1-98) years were included in the study. Of the patients seen in the urology clinic, 637 (28.99%) were referred from the green zone, 703 (32.04%) from the yellow zone, 221 (10.10%) from the red zone, and 636 (28.86%) from other branches. Of the patients, 1.623 (73.87%) presented between 08:00-16:00, 406 (18.48%) between 16:00-00:00, and 168 (7.64%) between 00:00-08:00, (Table 1). Patients were most frequently consulted with 13 different ICD codes, with "Hematuria; R31" being the most common, and after urological evaluation, the most common diagnosis was "Renal colic; N23" (Table 2). The ICD codes of patients who requested urology consultations from emergency areas were found to have a statistically significant compatibility with the ICD codes of patients after urological evaluation (kappa: 0.863, p<0.05). This significant compatibility was also observed in the classified evaluations in terms of the unit and hours of consultation requests (Table 1). Although the decrease was statistically significant, it was found that the compatibility

rate decreased during peak hours of patient volume (08:00-16:00 kappa: 0.856, 16:00-00:00 kappa: 0.878, 00:00-08:00 kappa: 0.887).

Discussion

Data coded and reported using the ICD offer standard terminology and classification, in a conceptual framework independent of language and culture (1). Through this, ICD-based national data systems have been developed to determine priorities by analyzing data on incidence and mortality rate, especially in situations threatening public health like cancer. After the National Cancer Institute of America launched the SEER (Surveillance, Epidemiology, and End Results) program in 1973, the World Health Organization published the International Classification of Diseases-Oncology (ICD-O) in 1976 (3,4). ICD-O was approved in our country in 2013 and came into force in 2016 (5). However, the recent pandemic has revealed that systems collecting only cancer cases are insufficient. Comprehensive databases providing data on acute and chronic diseases affecting public health are still lacking. In our study, the reliability of ICD codes in automation systems that will also provide sources for non-oncology databases was evaluated through a pilot study. Even in departments with relatively higher patient volume, such as the emergency department, diagnostic reliability was found to be high.

In programs with comprehensive and continuous data entry, like national databases, ensuring data reliability at the beginning is important, but it is also crucial to design the process in a way that allows for continuous testing of data reliability (6). Our study found that, although statistically significant, data reliability slightly decreased during peak hours of patient volume. The high accuracy of urological diagnoses was thought to be related to the lower patient volume in the urology consultation area compared to clinics. In addition to facilitating data entry into automation systems, it was concluded that employing a sufficient and competent workforce might be effective in ensuring data security. Providing optimal workforces and physical conditions was thought to facilitate the monitoring of dynamic data flow.

Study Limitations

The data from our study are too limited to support the claim that sufficient reliability has been achieved for the creation of national database programs. This necessitates multicenter, high-volume studies. Our study conducted in

Table 1. Compatibility of urological and emergency ICD codes with Cohen kappa analysis

	n	Kappa	p-value
UROLOGY /ICD EMERGENCY Green Zone_08:00am-16:00pm	498	0.785	<0.05
UROLOGY /ICD EMERGENCY Green Zone_16:00pm-:00pm	102	0.834	<0.05
UROLOGY /ICD EMERGENCY Green Zone_00:00pm-08:00am	37	0.790	<0.05
UROLOGY /ICD EMERGENCY Yellow Zone_08:00am-16:00pm	444	0.831	<0.05
UROLOGY /ICD EMERGENCY Yellow Zone_16:00pm-:00pm	178	0.867	<0.05
UROLOGY /ICD EMERGENCY Yellow Zone_00:00pm-08:00am	81	0.902	<0.05
UROLOGY /ICD EMERGENCY Red Zone_08:00am-16:00pm	110	0.836	<0.05
UROLOGY /ICD EMERGENCY Red Zone_16:00pm-:00pm	67	0.879	<0.05
UROLOGY /ICD EMERGENCY Red Zone_00:00pm-08:00am	44	0.949	<0.05
UROLOGY /ICD EMERGENCY Others Zone_08:00am-16:00pm	571	0.939	<0.05
UROLOGY /ICD EMERGENCY Others Zone_16:00pm-:00pm	59	0.981	<0.05
UROLOGY /ICD EMERGENCY Others Zone_00:00pm-08:00am	6	0.760	<0.05
UROLOGY /ICD EMERGENCY_Green Zone_Total	637	0.794	<0.05
UROLOGY /ICD EMERGENCY_Yellow Zone_Total	703	0.849	<0.05
UROLOGY /ICD EMERGENCY_Red Zone_Total	221	0.873	<0.05
UROLOGY /ICD EMERGENCY_Others Zone_Total	636	0.942	<0.05
UROLOGY /ICD EMERGENCY_08:00am-16:00pm_Total	1623	0.856	<0.05
UROLOGY /ICD EMERGENCY_16:00pm-00:00pm_Total	406	0.878	<0.05
UROLOGY /ICD EMERGENCY_00:00pm-08:00am_Total	168	0.887	<0.05
UROLOGY /ICD EMERGENCY_Total	2197	0.863	<0.05

ICD: International classification of diseases, Others zone: General surgery, internal medicine, pediatry

Table 2. Distribution of urological and emergency ICD codes

Emergency ICD	Urology ICD													
	C62	N17	N20	N23	N30	N39	N44	N45	R10	R30	R31	R33	S37	Total
C62	12													12
N17		75		20										95
N20			288											288
N23				66					36					102
N30				25	219									244
N39				45		216								261
N44							40							40
N45								200						200
R10				52					80					132
R30				36						132				168
R31				45							294			339
R33				12								288		300
S37													16	16
Total	12	75	288	301	219	216	40	200	116	132	294	288	16	2197

C62: Malignant neoplasm of testis, N17: Acute renal failure, N20: Calculus of kidney and ureter, N23: Unspecified renal colic, N30: Cystitis, N39: Other disorders of urinary system (urinary tract infection, proteinuria or incontinence), N44: Torsion of testis, N45: Orchitis and epididymitis, R10: Abdominal and pelvic pain, R30: Pain associated with micturition, R31: Unspecified haematuria, R33: Retention of urine, S37: Injury of urinary and pelvic organs

the busy emergency department serves as a pilot study that will pave the way for similar studies in different clinics.

Conclusion

The reliability of diagnosis codes is high even in high-volume areas like emergency departments. These results have inspired the creation of secure databases that will provide a source for diagnosis code-based studies for non-cancer entities affecting public health in our country.

Ethics

Ethics Committee Approval: After obtaining data usage permission from the Local Ethics Committee (University of Health Sciences Turkey, Gaziosmanpaşa Training and Research Hospital Clinical Research Ethics Committee, date: 16.08.2023, no: 118).

Informed Consent: Retrospective studyç.

Footnotes

Authorship Contributions

Surgical and Medical Practices: S.G., S.K., M.G.K., M.G., S.S., S.Sü., S.Y., M.M.D., E.K., E.Y., A.Y.M., Concept: S.G., S.K., M.G.K., M.G., S.S., S.Sü., S.Y., M.M.D., E.K., E.Y., A.Y.M., Design: S.G., S.K., M.G.K., M.G., S.S., S.Sü., S.Y., M.M.D., E.K., E.Y., A.Y.M., Data Collection or Processing: S.G., S.K., M.G.K., M.G., S.S., S.Sü., S.Y., M.M.D., E.K., E.Y., A.Y.M., Analysis or Interpretation: S.G., S.K., M.G.K., M.G., S.S., S.Sü., S.Y., M.M.D., E.K., E.Y., A.Y.M., Literature Search: S.G., S.K., M.G.K., M.G., S.S., S.Sü., S.Y., M.M.D., E.K., E.Y., A.Y.M., Writing: S.G., S.K., M.G.K., M.G., S.S., S.Sü., S.Y., M.M.D., E.K., E.Y., A.Y.M.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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