

Comparison of Patients' Admissions to the Cardiology Outpatient Clinics Between the Appointment System and the Queue System

Kardiyoloji Polikliniğine Yapılan Hasta Başvurularının Hekim Randevu Sistemi ile Kuyruk Sistemi Arasında Karşılaştırılması

ABSTRACT

Objective: The appointment system has been developed and implemented to eliminate difficulties with queued admissions. To identify and eliminate admission gaps, this study examined the characteristics of patients who applied to the cardiology outpatient clinic via appointment and queue systems.

Methods: The study comprised 2135 cardiology outpatients. Patients were divided into 2 groups based on whether they used appointments (group 1) or the queue (group 2). Both groups' and non-cardiac diagnosed patients' demographic, clinical, and presentational variables were compared. Comparing patients' characteristics by appointment-to-visit time was also done.

Results: There were 1088 female participants (51%). Female gender (54.8%) and individuals aged $\geq 18-64$ (69.8%) years were significantly higher in group 1. While the rate of first admission ($P=0.003$) patients was significantly higher in group 1, the rate of patients followed up ($P=0.003$) and disabled ($P=0.011$) was significantly higher in group 2. Patients' rate with non-cardiac complaints was 40.2% in group 1, but it was significantly lower in group 2 at 22.2% than in group 1 ($P=0.001$). Admissions to the emergency department within the last month were significantly higher in group 2 than group 1 ($P=0.021$), this rate was significantly higher in favor of group 1 ($P=.031$) in patients with non-cardiac diagnoses. In addition, patients who requested a general examination and had no complaints were significantly higher in group 1 than in group 2 ($P=0.003$). Comparing the post-examination diagnoses, it was shown that group 2 (76.3%) had a higher rate of cardiac diagnoses than group 1 (51.5%). The presence of cardiac-related complaints ($P=0.009$) and appointment-to-visit time ≥ 15 days ($P=0.013$) were found to be significant independent predictors of admission to the emergency department. The rates of patients with cardiac-related complaints (40.8%) and patients under follow-up (63%) were higher in the group with a gap of ≥ 15 days between appointment-to-visit time.

Conclusion: Prioritizing patients by complaints, clinical features, medical history, or cardiovascular risk factors can enhance appointment scheduling.

Keywords: Appointment system, cardiology, outpatient clinics, queue system

ÖZET

Amaç: Randevu sistemi, kuyruk sisteminin zorluklarını ortadan kaldırmak için geliştirilmiş ve uygulamaya geçirilmiştir. Bu çalışmada, kardiyoloji polikliniğine randevu ve kuyruk sistemi ile başvuran hastaların özellikleri incelenerek, varsa eksikliklerin giderilmesini sağlayacak verilerin eldesi amaçlanmıştır.

Yöntemler: Çalışma 2135 kardiyoloji polikliniği hastasını içermektedir. Hastalar, randevu (Grup-1) veya kuyruk (Grup-2) sistemi ile başvurularına göre iki gruba ayrılmıştır. Hem her iki grubun hem de kardiyak dışı tanı alan hastaların demografik, klinik ve başvuru özellikleri ile ilgili verileri karşılaştırıldı. Randevu alımı ile poliklinik başvurusu arasındaki zamana göre hasta verilerinin karşılaştırılması da yapıldı.

Bulgular: 1088 katılımcının %51'i kadındı. Grup-1'de kadın cinsiyet ve $\geq 18-64$ yaş arası bireyler anlamlı olarak daha yüksekti. Grup-2'de takipli ($P=0.003$) ve özürü ($P=0.011$) hasta oranı anlamlı olarak daha yüksekti. Kalp dışı yakınmaları olan hasta oranı Grup-1'de %40,2 iken, Grup-2'de %22,2 ile Grup-1'e göre anlamlı olarak daha düşüktü ($P=0.001$). Acil servise son bir ay içinde başvuru bulunuşu Grup-2'de anlamlı olarak yüksekti ($P=0.021$). Kardiyak şikayetlerin varlığı ($P=0.009$) ve ziyarete gelme süresinin ≥ 15 gün olması ($P=0.013$) acil servise başvuru

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bulunuşunun anlamlı bağımsız öngördürücüleri olarak saptandı. Muayene sonrası tanılar karşılaştırıldığında, Grup-2' de (%76,3), Grup-1'e (%51,5) göre daha yüksek oranda kalp hastalığı tanısı alındığı gözlemlendi. Randevu ile ziyaret arası 15 gün ve üzeri olan grupta kardiyak yakınması olan (%40,8) ve takip altında olan (%63) hasta oranı daha yüksekti.

Sonuç: Hastaların, randevu oluşturma sırasında, yakınma ve klinik özelliklerinin, tıbbi öykülerinin veya kardiyovasküler risk faktörlerinin göz önünde bulundurulması önceliklendirilmeleri, randevu sistemi işleyişini daha verimli hale getirebilir.

Anahtar Kelimeler: Kardiyoloji, kuyruk sistemi, poliklinik, randevu sistemi

Our country's national healthcare system has been undergoing a transformation process for many years.¹ Development in information and communication technologies and the integration of technology into the healthcare system have resulted in significant changes and reforms in the accessibility, quality, and delivery of healthcare services.² As an illustration of these arrangements, the appointment system admits patients to outpatient clinics according to a set of rules, as opposed to the queue system that functions on the "first come, first served" premise for hospital admissions. Appointment scheduling was carried out to avoid shortages in the delivery of health services caused by patient admissions to outpatient clinics via the queue system, to generate a regular workload, to disperse the patient flow over time, and to guarantee that on-site personnel is utilized.³ In spite of all efforts to make the health system more accessible and to provide quality care, the rising demand for health services and the shortage of healthcare providers have necessitated the acceleration of care provision, and a mismatch has developed between patient expectations and healthcare delivery.⁴⁻⁶ Determining the conditions to be considered inpatient admission to the cardiology outpatient clinic, which is one of the most frequently utilized outpatient clinics, may help with the elimination of gaps in this area and the implementation of new regulations in outpatient services.

The purpose of this study is to examine the sociodemographic characteristics, complaints and admission features, and comorbid conditions of patients to the cardiology outpatient clinic via appointment and queuing systems. To the best of our knowledge, this is the first study in which patients admitted to the cardiology outpatient clinic were compared based on the admission method.

Materials and Methods

Study Design and Population

In this retrospective and 2-center study, 2135 consecutive patients aged 18 and older who sought outpatient cardiology clinics between January 2022 and June 2022 were included. Admissions to the outpatient clinic were divided into 2 groups based on whether they used the appointment system (group 1, n=1065) or the queue system (group 2, n=1070). Patients who were admitted to outpatient clinics through the queue system were those who were unable to schedule an appointment. All patients admitted with the queue system were evaluated during the remaining time after the patients with an appointment were examined, or by substituting for the no-show patients with appointments.

Data Collection

The datasets for both study groups were retrospectively collected using the hospital registry system and the e-nabız application system.

External outpatient referrals for preoperative examination, patients referred from the emergency department, and patients evaluated for admission to the health board were not included in the study. Ages, genders, educational levels, employment status, type of admission, number of complaints, types of complaints (cardiac vs. non-cardiac), reason for admission, and diagnoses after evaluation were all recorded for the patients who took part in the study. Admissions made by patients to the other centers' same departments within the last month and emergency services within the last month were noted. Chest pain, dyspnea, palpitation, exertional angina, exertional dyspnea, fatigue, swelling in the legs, headaches, as well as numbness in the arms were among the various complaints mentioned by the patients.

Chest pain of cardiac origin is characterized by discomfort, pressure, heaviness, or pain in the chest or under the breastbone, which may radiate to the back, jaw, throat, or arm, at rest or during activity. Chest pain was considered stable angina pectoris (SAP) if it was caused by the patient walking swiftly or uphill (or walking on the plain, for those who had not done more) and was relieved by nitroglycerin, or if it was relieved by stopping or slowing down for 10 minutes or less in patients who were unable to take nitroglycerin.⁷ When troponin was negative and there was no permanent ST-segment elevation in the 12-lead electrocardiogram (ECG), as well as when chest pain was present at rest, with little exertion, or at night and was accompanied by a normal ECG or dynamic ST-T changes, unstable angina pectoris (UAP) was considered.⁸ Myalgia was defined as the presence of stinging, short-term pain in the anterior chest wall, unrelated to exertion, that altered with pressure, breathing, or movement, and improved with analgesic-anti-inflammatory medication. In individuals with high-risk factors, exercise ECG and/or myocardial perfusion scintigraphy ruled out coronary artery disease causing ischemia. A diagnosis of anemia is made when the hemoglobin, iron, ferritin, and transferrin concentrations within the blood fall below the defined reference range linked with the symptoms. Dyspnea related to heart disease was regarded as the presence of difficulty breathing or coughing when lying down; waking up at night with shortness of breath and the need to prop up the head of the bed with several pillows; or shortness of breath accompanying mild exertion. Also, swelling in the legs caused by fluid accumulating in the body was considered a cardiac complaint. Myalgia, anemia, general examination, and anxiety-panic disorder were accepted as non-cardiac diagnoses.

If a non-cardiac diagnosis such as anxiety disorder-panic attack was considered after patient evaluation, confirmation of the diagnosis was sought by the clinicians of the relevant department in order to include patient data in the study. Patients were also assessed depending on whether they were the initial admission

patient or the follow-up patient. In addition, the time between making an appointment and admission to the outpatient clinic for patients using the appointment system was documented, and the distribution of demographic and admission-related variables was made taking these periods into consideration. Patients' pre-admission diagnoses of hypertension (HT), diabetes mellitus (DM), hyperlipidemia (HL), coronary artery disease (CAD), heart failure, pulmonary hypertension (PH), valve disease, arrhythmia, and smoking habits were also recorded and compared between the 2 groups. Ethical approval was obtained from the Non-invasive Research Ethics Committee (protocol no: 2022/03-10).

Statistical Analysis

Statistical Package for the Social Sciences 26.0 program was used to analyze the data obtained from the study (IBM Corp., Armonk, New York, 2017). The distribution of categorical variables was presented using number (n) and percentage (%). The

Chi-square (Pearson Chi-square, Fisher's exact test) test was used to examine categorical data. A multivariate logistic regression model with a significant effect was obtained by including all the variables with the forward stepwise (Wald) method to determine the important independent predictors of the presence of an emergency application within the last 1 month and the presence of an admission to the same department in another center within the last 1 month. Results were reported as odds ratios (OR) with 95% confidence intervals (CIs). *P* < .05 was considered statistically significant.

Results

Table 1 shows the comparison of demographic and presentation characteristics of patients between groups. Of the 2135 participants, 1088 (51%) were female, and the female gender (n = 584, 54.8% vs. n = 504, 47.1%) was significantly higher in group 1 as

Table 1. Comparison of Demographic and Presentation Characteristics of Patients between Groups

		Group 1 (n=1065)		Group 2 (n=1070)		χ^2	<i>P</i>
		n	%	n	%		
Age (years)	18-64	743	69.8	564	52.7	26.992	0.001
	65-74	209	19.6	303	28.3		
	≥75	113	10.6	203	19.0		
Gender	Female	584	54.8	504	47.1	14.131	0.003
	Male	481	45.2	566	52.9		
Employment status	Employed	366	34.4	225	21.0	8.422	0.011
	Unemployed	421	39.5	401	37.5		
	Retired	230	21.6	352	32.9		
	Disabled	48	4.5	92	8.6		
Type of the admission	First admission	615	57.7	485	45.3	11.775	0.003
	Under the follow-up	450	42.3	585	54.7		
Type of complaints	Cardiac-related	284	26.7	400	37.4	23.843	0.001
	Non-cardiac	428	40.2	238	22.2		
	No complaints	353	33.1	432	40.4		
Number of complaints	1	365	34.3	256	23.9	24.258	0.001
	>1	347	32.6	382	35.7		
	No complaints	353	33.1	432	40.4		
Reason for admissions	Admissions for control	131	12.3	190	17.8	21.761	0.003
	Admissions for prescription	80	7.5	140	13.1		
	Request to be examined during prescription admissions	54	5.1	86	8.0		
	Due to complaints	712	66.8	638	59.6		
	No complaints, request for cardiac examination	88	8.3	16	1.5		
ED admissions within the last month		127	11.9	184	17.2	5.375	0.021
Same department admissions within the last month		212	19.9	146	13.6	9.265	0.008

ED, emergency department.
P < 0.05

compared with group 2, respectively. While the number of individuals aged 18–64 years ($n=743$, 69.8% vs. $n=564$, 52.7%) was significantly higher in group 1 than in group 2, the number of patients aged 65–74 years ($n=303$, 28.3% vs. $n=209$, 19.6%) and ≥ 75 years ($n=203$, 19.0% vs. $n=113$, 10.6%) was significantly higher in group 2 than in group 1, respectively. When the patients' employment status was compared between the 2

groups, those in group 1 had a significantly higher percentage of employed patients than those in group 2 ($n=366$, 34.4% vs. $n=225$, 21%), while those in group 2 had a significantly higher percentage of retired ($n=352$, 32.9% vs. $n=230$, 21.6%) and disabled ($n=92$, 8.6% vs. $n=48$, 4.5%) patients than those in group 1, respectively. The patients admitted to the outpatient clinic for the first time ($n=615$, 57.7%) were significantly higher

Table 2. Comparison of Clinical Characteristics of Patients between Groups

	Group-1 (n = 1065)		Group-2 (n = 1070)		χ^2	P
	n	%	n	%		
Complaints						
Chest pain	310	29.1	240	22.4	7.787	0.006
Dyspnea	178	16.7	247	23.1	6.227	0.013
Palpitation	190	17.8	162	15.1	1.307	0.283
Exertional angina	115	10.8	158	14.8	3.476	0.038
Exertional dyspnea	152	14.3	208	19.4	5.325	0.022
Fatigue	145	13.6	120	11.2	1.427	0.265
Swelling in the legs	88	8.3	124	11.6	6.782	0.012
Numbness in the arms	43	4.0	38	3.6	1.802	0.124
Headache	91	8.5	114	10.7	1.992	0.098
Risk factors-past diagnosis						
Smoking habit	533	50.0	495	46.3	1.172	0.294
Diabetes	250	23.5	270	25.2	0.537	0.475
Hypertension	549	51.5	575	53.7	0.604	0.457
Coronary artery	258	24.2	358	33.5	11.636	0.003
Heart failure	106	10.0	143	13.4	15.497	0.001
Hypertlipidemia	218	20.5	286	26.7	6.127	0.014
VHD	77	7.2	128	12.0	6.783	0.010
PH	15	1.8	30	2.8	5.952	0.019
Arrhythmia	124	11.6	222	20.7	16.738	0.001
Diagnosis after examination						
Myalgia	164	15.4	106	9.9	27.480	0.001
CAD	144	13.5	188	17.6		
Heart failure	75	7.0	114	10.7		
Arrhythmias	70	6.6	121	11.3		
VHD	52	4.9	65	6.1		
Hypertension	111	10.4	125	11.7		
General examination	88	8.3	16	1.5		
Anxiety-PD	131	12.3	64	6.0		
UAP	28	2.6	51	4.8		
SAP	40	3.8	98	9.2		
Anemia	133	12.5	68	6.4		
Pericarditis-myocarditis	14	1.3	24	2.2		
PH	15	1.4	30	2.8		

CAD, coronary artery disease; PD, panic disorder; PH, pulmonary hypertension; SAP, stabil angina pectoris; UAP, unstabil angina pectoris; VHD, valvular heart disease.

$P < 0.05$.

in group 1, whereas this rate was significantly higher in group 2 in favor of the followed-up patients (n=585, 54.7%). While the rate of patient with non-cardiac complaints was 40.2% in group 1, it was significantly lower in group 2 at 22.2% than in group 1. In group 2, in contrast to group 1, the percentage of patients with cardiac complaints (n=400, 37.4% vs. n=284, 26.7%) was found to be significantly higher than in group 1, respectively. In addition, patients who requested a general examination and had no complaints (n=88, 8.3% vs. n=16, 1.5%) were significantly higher in group 1 than in group 2, respectively. Those with a cardiac diagnosis who admitted for control, those who admitted for a prescription, and those who requested to be evaluated when admitted for a prescription [(n=190, 17.8% vs. n=131, 12.3%), (n=140, 13.1% vs. n=80, 7.5%), (n=86, 8.0% vs. n=54, 5.1%)] were significantly higher in group 2 compared to group 1, respectively. The emergency department admissions within the last month (n=184, 17.2% vs. n=127, 11.9%) were significantly higher in group 2 than in group 1, whereas the same department admissions in another center within the last month (n=212, 19.9% vs. n=146, 13.6%) were significantly higher in group 1 than in group 2, respectively.

Table 2 shows the comparison of clinical characteristics of patients between groups. Upon comparing the post-examination diagnoses of the 2 groups, it was shown that group 2 (76.3%) had a higher rate of cardiac disease diagnoses than group 1 (51.5%). The multivariate logistic regression analysis, which included all variables, was performed to predict the presence of emergency admissions within the last month and the presence of admissions to the same department at another center within the last month. The presence of cardiac-related complaints as the reason for outpatient clinics admissions [b=2.131, P=.009; OR 8.422; 95% CI (1.111-63.861)] and time elapsed between arranging an appointment and actual visit ≥ 15 days [b=-0.895, P=.013; OR 0.408; 95% CI (0.194-0.861)] were

found to be significant independent predictors of admissions to the emergency department within the last month. On the other hand, it was found that the type of admission identified as "first admission" [b=1.782, P=.003; OR 5.943; 95% CI (2.964-11.915)] and the type of complaint identified as "non-cardiac" [b=2.013, P=.001; OR 7.485; 95% CI (3.818-14.675)] were significant independent predictors of admissions to the same department of another center within the last month.

The distribution of variables according to the time elapsed between arranging an appointment and the actual visit in patients who were admitted using the appointment system is shown in Table 3. When the time between arranging an appointment and actual visit was classified as 1-7 days, 8-14 days, and ≥15 days, it was observed that the rate of patients aged ≥ 18-64 was higher in all time intervals compared to other age groups. In addition, the rates of patients with cardiac-related symptoms and patients under follow-up were higher in the group with a gap of ≥15 days between the appointment and the actual visit. On the other hand, the time between making an appointment and the actual visit was 1-7 days with a higher rate (75.5%) in patients whose type of admission to the outpatient clinic was "first admission."

Diagnoses such as myalgia, anemia, general examination, or anxiety disorder-panic attack were considered non-cardiac diagnoses. Comparison of demographic, presentation, and clinical characteristics of patients with non-cardiac diagnoses between groups is shown in Table 4. While 48.5% of the patients (n=516) in group 1 were diagnosed with non-cardiac disease, this rate was just 23.7% (n=254) in group 2. Individuals aged ≥18-64 years (66.3%) in group 1 showed a higher percentage of non-cardiac diagnoses compared to the individuals aged 65-74 (24.2%) and ≥ 75 (9.5%), as well as all age groups in group 2. The admission type of non-cardiac diagnosis patients

Table 3. The Distribution of Variables According to the Appointment-Actual Visit Time of Patients

		1-7 days (n=470)		8-14 days (n=294)		≥ 15 days (n=301)	
		n	%	n	%	n	%
Age (years)	≥18-64	401	85.3	195	66.3	147	48.8
	65-74	51	10.9	72	24.5	86	28.6
	≥ 75	18	3.8	27	9.2	68	22.6
Education level	Illiterate	21	4.5	44	15.0	93	30.9
	Elementary	280	59.6	135	45.9	91	30.2
	Middle education	18	3.8	33	11.2	57	18.9
	High school	72	15.3	55	18.7	36	12.0
	University+	79	16.8	27	9.2	24	8.0
Type of the admission	First admission	355	75.5	155	52.7	105	37.0
	Under the follow-up	115	24.5	139	47.3	196	63.0
Type of complaint	Cardiac-related	82	17.4	79	26.9	123	40.8
	Non-cardiac	198	42.1	144	49.0	86	28.6
	No complaints	190	40.4	71	24.1	92	30.6

Table 4. Comparison of Demographic, Presentation, and Clinical Characteristics of Patients with Non-cardiac Diagnosis between Groups

		Group 1 (n=516)		Group 2 (n=254)		χ^2	P
		n	%	n	%		
Age (years)	≥18-64	342	66.3	89	35.0	15.102	0.002
	65-74	125	24.2	87	34.3		
	≥ 75	49	9.5	78	30.7		
Gender	Female	327	63.4	141	55.5	10.132	0.012
Type of the admissions	First admission	504	97.6	249	97.9	0.107	0.816
	Under the follow-up	12	2.4	5	2.1		
Type of complaints	Cardiac-related	0	0.0	0	0.0	8.906	0.010
	Non-cardiac	428	82.9	238	93.7		
	No complaints	88	17.1	16	6.3		
ED admissions within the last month		48	9.3	13	5.1	5.218	0.031
Same department admissions within the last month		159	30.8	43	18.9	13.324	0.008
Reason for admissions	Due to complaints	428	82.9	238	93.7	13.702	<0.001
	No complaints, request cardiac examination	88	17.1	16	6.3		
Number of complaints	1	280	54.3	164	64.6	9.011	0.011
	>1	148	28.7	74	29.1		
	No complaints	88	17.0	16	6.3		
Complaints	Chest pain	171	33.1	53	20.9	6.371	0.013
	Dyspnea	104	20.6	34	13.4	1.758	0.112
	Palpitation	125	24.2	36	14.2	5.307	0.023
	Exertional angina	46	8.9	21	8.3	1.476	0.138
	Exertional dyspnea	60	11.6	25	9.8	1.625	0.121
	Fatigue	158	30.6	120	47.2	8.127	0.005
	Swelling in the legs	22	4.3	17	6.7	2.182	0.062
	Numbness in the arms	44	8.5	27	10.6	1.502	0.124
	Headache	81	15.7	21	8.3	1.992	0.068

$P < .05$.

to the outpatient clinic was similar ($P = .816$) between group 1 and group 2 in favor of the first admission ($n = 504$, 97.6% vs. $n = 249$, 97.9%). Admissions to the emergency department and another centers' same department within the last month were significantly higher in favor of group 1 ($P = .031$ vs. $P = .008$) in patients with non-cardiac diagnoses, respectively.

Discussion

The appointment system was devised and deployed in response to the queuing system's challenges. Although it is intended to aid physicians in time management, enhance the quality of patient care, and facilitate outpatient treatment,^{9,10} the efficiency of the appointment system is still a subject of debate.¹¹ The present study revealed that more than half of the patients who were admitted to the cardiology outpatient clinic via the appointment system were female, almost half of them appeared to

have non-cardiac problems, and their post-evaluation diagnosis was non-cardiac. In addition, despite the absence of cardiac complaints or disease history, the rate of admissions for general examination was extremely high. On the other hand, it has been observed that male gender, advanced age, disabled patients, those with cardiac complaints and follow-up examinations, and those with relatively serious diseases were admitted through the queuing system at a higher rate for evaluation.

According to our study, female predominance in the patient group with an appointment and non-cardiac diagnosis may be due to the fact that females seek health services more often than males,^{12,13} males delay seeking medical help more,¹⁴ and the prevalence of anemia,^{15,16} pain,¹⁷ and anxiety-panic attack disorder^{18,19} is higher in female than in male. In addition, similar to the findings of previous studies,^{9,20} our study revealed that

patients aged ≥ 18 –64 years were admitted for an appointment system at a higher rate and received appointments in a shorter time than the older age group. This result could be due to their having greater control over the use of digital tools, the internet, and call center access for scheduling appointments than older generations.

In our nation, there is no referral system that is based on primary care physicians; instead, individuals are able to visit any specialist in a hospital setting by making an appointment with that professional.¹¹ This system enabled every citizen to schedule an appointment with the departments responsible for conditions requiring urgency or follow-up, such as cardiology, without undergoing a necessity–priority evaluation of the reason for the admission. We assume that the higher rate of patients with first admission, non-cardiac symptoms, and non-cardiac final diagnoses in the group appointment system when compared to the group queue system in our study may be a result of this situation. In a study by Paul et al.²¹ it was revealed that more than half of the patients who were admitted to the cardiology outpatient clinics presented with non-cardiac problems, and this could be explained by the lack of an appropriate referral system.

Patients who visit outpatient clinics sometimes may have rather significant conditions, thus they should not be subjected to overly extended wait periods. However, disabled patients, those with really critical challenges, cardiac complaints, and previous diagnoses, requiring medication or follow-up care may have to wait a long time to be evaluated by a specialist due to appointment admissions with no or non-cardiac complaints who do not pass the evaluation filter. In a study by Cayirli et al.²² it was revealed that it is advantageous to use additional information about the patient in scheduling patient appointments in outpatient settings. Since it is difficult to schedule appointments for so many patients due to limited supply capacity,¹¹ and given the ease of necessity–priority assessment by healthcare professionals, the queuing system may allow for a relatively higher rate of targeted patient evaluation than the appointment system. This may explain why the rates of cardiac complaints, patients under follow-up, advanced age, comorbid conditions, and disabled patients were higher in patients presenting with the queuing system in our study. But notwithstanding, the presence of cardiac complaints and the presence of ≥ 15 days between appointment and actual visit, both of which have been shown to be independent predictors of emergency department admission within the last month, may suggest that these patients were unable to receive cardiological evaluation. For all the reasons mentioned earlier, the necessity of using both patient evaluation methods at the same time causes the outpatient clinics to be overcrowded and congested, with lengthy wait times and heavy overtime, which negatively affects the morale of healthcare practitioners and patient satisfaction.²³

We think that our study has several limitations. Considering the density of outpatient admissions in public hospitals, we think that the inclusion of only patients with all available information for a 6-month period is a limitation of our study due to the low number of patients. The fact that the data of patients who made an appointment and did not apply to the outpatient clinic were not included in the analysis may be another limitation. A

multicenter study with a larger sample size could provide information that clarifies the best course of action for delivering cardiology outpatient care.

A systematic and scalable control mechanism should be used to assess and eliminate inappropriate access to outpatient clinics in the field of cardiology. The appointment system could function more efficiently if it took into account the patient's complaint (if any), type of complaint, prior medical history, or cardiovascular risk status. Therefore, while facilitating access to both life-saving and life-enhancing care and treatments, we believe that those with typical cardiac complaints, those who have previously been diagnosed with heart disease and need regular follow-up or medication, and the elderly or disabled patients who may be exposed to a supply–demand imbalance in the appointment system due to difficulties in using the phone or online system, should be given priority.

Ethics Committee Approval: Ethical committee approval was received from the Ethics Committee of University of Health Sciences, Izmir Tepecik Training and Research Hospital (Approval No: 2022/05-04).

Informed Consent: Consent forms were not obtained from the participants because of the retrospective study design.

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