ORIGINAL ARTICLE

Effects of fast-track in a university emergency department through the national emergency department overcrowding study

Gokhan Aksel,[1] Fikret Bildik,[2] Ahmet Demircan,[3] Ayfer Keles,[4] Isa Kilicaslan,[5] Sertac Guler,[6] Seref Kerem Corbacioglu,[7] Asli Turkay,[8] Burak Bekgoz,[9] Nurettin Ozgur Dogan[10]

Abstract

Objective: To determine the impact of a fast track area on emergency department crowding and its efficacy for non-urgent patients.

Methods: The prospective cross-sectional study was conducted in an adult emergency department of a university-affiliated hospital in Turkey from September 17 to 30, 2010. Non-urgent patients were defined as those with Canadian Triage Acuity Scale category 4/5. The fast track area was open in the emergency department for one whole week, followed by another week in which fast track area was closed. Demographic information of patients, their complaints on admission, waiting times, length of stay and revisits were recorded. Overcrowding evaluation was performed via the National Emergency Department Overcrowding Study scale. In both weeks, the results of the patients were compared and the effects of fast track on the results were analysed. Continuous variables were compared via student's t test or Mann Whitney U test. Demographic features of the groups were evaluated by chi-square test.

Results: A total of 249 patients were seen during the fast track week, and 239 during the non-fast track week at the emergency department. Satisfaction level was higher in the fast track group than the non-fast track group ($p<0.001$). The waiting times shortened from 20 minutes to 10 minutes and length of stay shortened from 80 minutes to 42 minutes during the fast track week. Morbidity and mortality rates remained unchanged.

Conclusion: Owing to fast track, overcrowding in the emergency department was lessened. It also improved effectiveness and quality measures.

Keywords: Emergency service, Crowding, Patient satisfaction. (JPMA 64: 791; 2014)

Introduction

Even though the term Emergency Department (ED) overcrowding has been defined in diverse ways in the literature, the simplest and the most effective description was published in the "Emergency Department Crowding: High-Impact Solutions" report by the American College of Emergency Physicians (ACEP) in 2008 which defined ED overcrowding as lack of inpatient bed availability in the ED for patients waiting to receive emergency healthcare. Delays in urgent healthcare practices due to increasing numbers of patients cause overcrowding in EDs. When ED overcrowding occurs, patients, who wait to receive emergency healthcare, lie on gurneys, sit in chairs and often fill every available space. This situation certainly has negative effects on patient safety, comfort and satisfaction.[1]

Department of Emergency Medicine, [1]Baskent University School of Medicine, Bahcelievler, Ankara, Turkey, [2-5,9]Gazi University School of Medicine, Besevler, Ankara, Turkey, [6]Ankara Training and Research Hospital, Ankara, Turkey, [7]Antakya State Hospital, Hatay, Turkey, [8]Mersin State Hospital, Mersin, Turkey, [10]Kocaeli University, Faculty of Medicine, Kocaeli, Turkey.

Correspondence: Gokhan Aksel. Email: aksel@gokhanaksel.com

Many emergency departments (EDs) in the United States and Turkey are critically overcrowded, and this hampers the delivery of high-quality medical care.[1,2] Due to the continuing pressure to see increasing number of patients efficiently and safely, EDs have sought innovative ways to accomplish this goal. The creation of a fast track (FT) programme staffed by mid-level practitioners has been assumed to increase ED effectiveness for non-emergency patients.[3] FT areas can potentially improve patient flow without detrimentally affecting quality of care.[3,4]

In this study, our aim was to determine whether FT area was a high-impact solution for the problem of ED overcrowding. Keeping this primary aim in mind, we also endeavoured to find the effects of FT area on patient satisfaction, patients' costs, waiting times (WTs) of the patients in triage area and total length of patients' stay (LOS) in ED, number of patients leaving without being seen (LWBS), mortality and morbidity rates. Moreover, we intended to indicate the most convenient times for FT.

Methods

The prospective cross-sectional study was conducted in Turkey at the adult ED of a university-affiliated hospital

with 1000 beds, serving annually 45000 patients on average. Patients older than 18 years of age who presented to the ED between September 17 and 30, 2010, were included in the study. Since FT practice aimed at quick evaluation of the patients whose medical states did not require any urgency, patients who were qualified to be assessed within FT were categorised as those with Canadian Triage Acuity Scale 4 and 5 (CTAS 4/5). Patients younger than 18 years of age, patients with CTAS 1 to 3, and patients who refused to participate, were excluded. A room in ED, which was being earlier used for patient examination, was designated as the FT area. One of the emergency medicine residents with at least 3 years of experience conducted the study in each shift. The FT area was open in the ED for one whole week, followed by another week in which FT area was closed. During the week in which FT area was open (FT-week), patients with CTAS 4/5 were defined as Group 1 and having been assessed within FT, their information was recorded. In the following week during which there was no FT area (non-FT week), patients with CTAS 4/5 were defined as Group 2 and evaluated in other areas of the ED. The results of the patients with CTAS 4/5 were compared over the two weeks and the effects of FT on the results were analysed accordingly. In addition, we studied whether FT had a negative effect on patients with CTAS 1-3, who were excluded from the target group.

After approval by the institutional ethics committee and written consent of the subjects, demographic information of the patients with CTAS 4/5, their complaints on admission, WTs, LOS in ED, LWBS, total cost and whether they presented to ED again within 72 hours of their discharge were all recorded.

ED overcrowding evaluation was performed via the National Emergency Department Overcrowding Study (NEDOCS) scale at 08:00, 12:00, 16:00, 20:00, 00:00 and 04:00 hrs. Moreover, in every 8-hour shift, the number of outpatients who left without being seen together with the ambulance diversions was recorded. NEDOCS, developed in 2004 by Weiss et al,[5] is a tool to quantitatively describe the staff's sense of overcrowding. It is a web-based calculator which converts a simple data set into a score that correlates accurately with the degree of overcrowding as perceived by the senior staff working at that time. The NEDOCS includes 7 parameters: 1. total number of hospital beds, 2. total number of ED beds, 3. total number of patients (patient index which is the number of total patients in the ED at the time the score is calculated and which includes all patients in all areas of the ED including the resuscitation room, examination rooms, trauma room, waiting room, hallways, and fast track area), 4. number of patients with mechanical ventilation (MV) in ED, 5. the longest time a patient has waited for an inpatient bed at the time the score was calculated (admit time), 6. number of patients in ED waiting for inpatient beds (admit index), and 7. wait time of the patients in the triage area admitted last to ED in terms of hours (registration time). The 200-point NEDOCS scale ranges from 0 to 50 (normal), 51-100 (busy), 101-140 (overcrowded), 141-180 (severe), and >180 (disaster). As 2 of 7 parameters were invariable (total number of hospital beds, total number of ED beds), the other 5 variable parameters were compared.

Having been examined in ED and either discharged or admitted, patients were provided with a survey comprising 7 questions. A 5-point Likert Scale was used in the satisfaction surveys. According to this scale, 1 was "very poor" and 5 was "excellent". During the statistical evaluation, patients' options 1 and 2 on the Likert Scale were grouped as "poor" and options 4 and 5 as "good". Option 3 indicating "no idea" was excluded from the evaluation.

Finally, wait times of patients who were other than FT patients (CTAS 1-) were recorded.

For statistical analysis, SPSS 11.0 was used. Of the NEDOCS results presenting continuous variables in groups where FT area was open and was closed, and the parameters comprising this score, WT of patients in triage area, total LOS in ED and patients' costs, the ones conforming to normal distribution were compared via student t test and the ones non-conforming to normal distribution were assessed via Mann Whitney U test. Demographic features of the groups and comparison of satisfaction surveys with the groups were evaluated by Chi-Square test. $P<0.05$ was considered statistically significant.

Results

During the study period, a total of 2129 patients presented to the adult ED among whom 1795 (84.3%) were seen in ED and 308 (14.4%) of the presenting outpatients left without being seen. Overall, 26(1.2%) patients brought to ED by ambulance had to be

Table-1: Demographic data for CTAS 4/5 patient visits to Emergency Department.

Variable	Group 1 - CTAS 4/5 (FT* week) N=249	Group 2 - CTAS 4/5 (Non-FT week) N=239	P value
Age (Median) (min - max)	33 (18-82)	31(18-90)	0.292
Males (N)(%)	118 (47.4)	116 (48.5)	0.654
Females (N)(%)	131 (52.6)	123 (51.5)	0.654

FT*=Fast track
CTAS: Canadian Triage Acuity Scale.

Table-2: Complaints of Canadian Triage and Acuity scale category 4/5.

Chief complaint	Groups		Total
	Group 1 (FT* week) N (%)	Group 2 (Non-FT week) N (%)	
Ear/nose/throat problems	66 (26.5)	37 (15.5)	103 (21.1)
Minor trauma	44 (17.7)	54 (22.6)	98 (20.1)
Orthopaedic injury	41 (16.5)	45 (18.8)	86 (17.6)
Gastroenteritis, nausea, vomiting	17 (6.8)	16 (6.7)	33 (6.8)
Eye problems	13 (5.2)	20 (8.4)	33 (6.8)
Skin problems	22 (8.8)	11 (4.6)	33 (6.8)
Abdominal pain	10 (4.0)	21 (8.8)	31 (6.4)
Genitourinary problems	9 (3.6)	17 (7.1)	26 (5.3)
Head ache	12 (4.8)	13 (5.4)	25 (5.1)
Psychiatric problems	12 (4.8)	5 (2.1)	17 (3.4)
Gynaecologic problems	1 (0.4)	0 (0)	1 (0.2)
Tooth ache	1 (0.4)	0 (0)	1 (0.2)
Cat/dog bites	1 (0.4)	0 (0)	1 (0.2)
Total	249 (100)	239 (100)	488 (100)

FT*=Fast track.

Table-3: Comparisons between Group 1 and Group 2 in terms of patients' wait time, total length of stay in ED, total costs to patients, patients who left without being seen and ambulance diversions.

Variables	Group 1(FT§-week) Median (min-max) or N (%)	Group 2 (Non-FT week) Median (min-max) or N (%)	P value
WT* (minutes)	10.00 (0 - 125)	20.00 (0 - 220)	<0.001
LOS† (minutes)	42.00 (5 - 355)	80.00 (5 - 390)	<0.001
Patient cost (USD‡)	13.89 (10.33 - 118.49)	14.87 (10.33 - 250.00)	0.113
LWBS† (N, %)	98 (31.8)	210 (68.2)	0.008
Ambulance diversions (N, %)	7 (26.9)	19 (73.1)	0.204

§FT: Fast track
*WT: Wait time
†LOS: Length of stay
‡USD: US Dollar
†LWBS: Left without being seen.

transferred to another medical facility (Figure). A total of 249 patients were seen during the FT week, and 239 during the non-FT week at the ED. Demographic data for all CTAS 4/5 patients was recorded (Table-1).

The most common presenting complaints were ear-nose-throat (ENT) diseases 103(21.1%), minor trauma 98(20.1%) and orthopaedic problems 86(17.6%) (Table-2).

Further, 17(6.8%) of the 249 patients in Group 1 were referred to relevant departments and 11(4.6%) of 239 in Group 2 were referred to relevant departments. In terms of consultation, no statistical significant difference was found between the groups (p=0.389).

A statistical significant difference was observed between Group 1 and Group 2 in terms of WTs and LOS (p<0.001, p<0.001, respectively) (Table-3). No statistical difference was detected in terms of total costs between the two groups (p<0.113).

Moreover, possible effects of FT on WTs of the patients with CTAS 1-3 were also studied. No statistically significant difference was found between WTs of the patients with CTAS 1-3 during the two weeks (p<0.128).

We endeavoured to determine the most frequent hours during which patients presented while FT area was open round the clock. The number of patient presentation times was statistically higher between 12:00-16:00 and 20:00-00:00 (p<0.001, p<0.001).

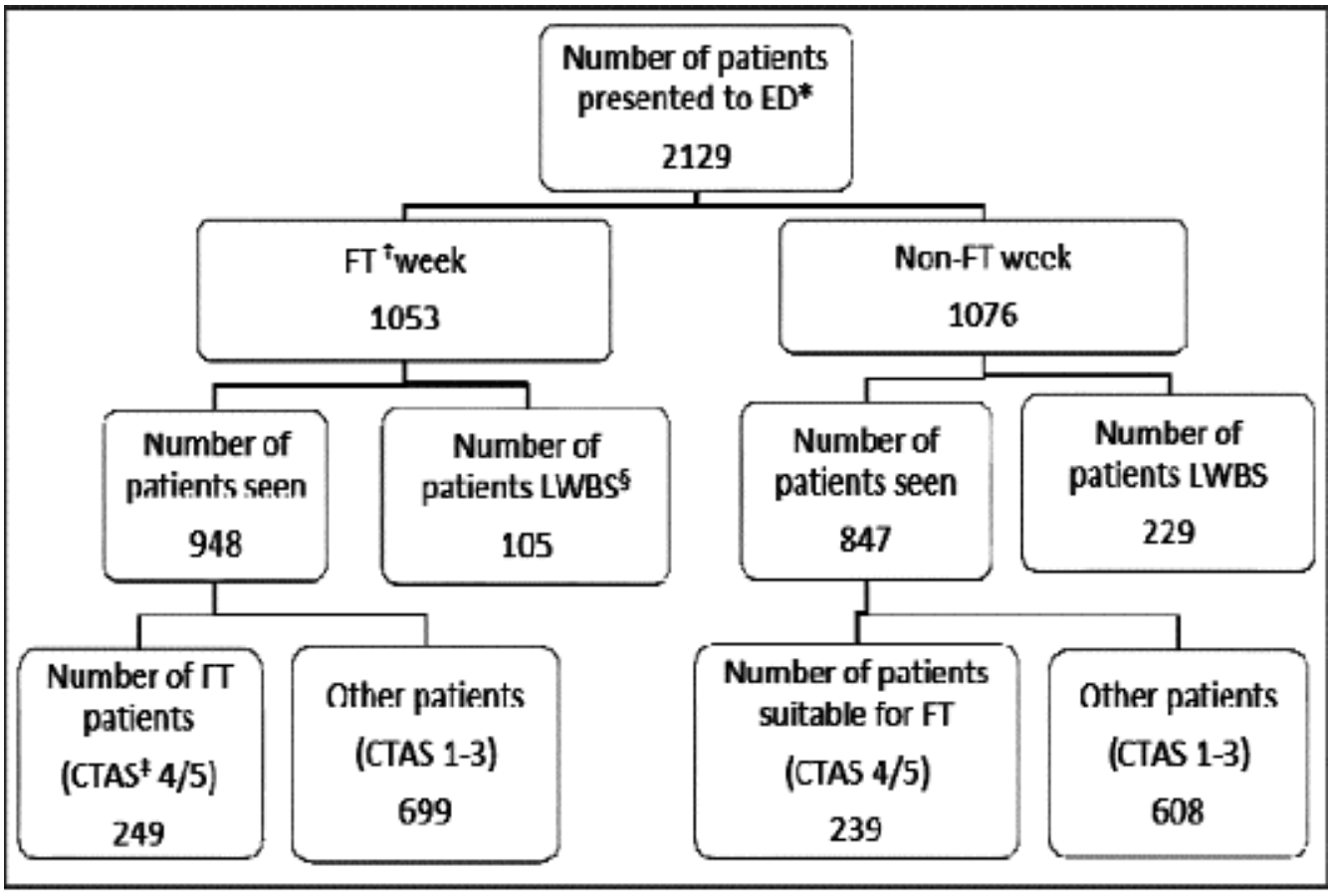
With regard to responses to questions in the survey, patient satisfaction in Group 1 was found significantly higher than the patients in Group 2 (p<0.001).

The number of LWBS in Group 2 was statistically higher

Table-4: Comparison of the NEDOCS§ scores and parameters that are used in the NEDOCS score.

	Group 1 (*FT week) mean ± SD or median (min-max)	Group 2 (non-FT week) mean ± SD or median (min-max)	P value
NEDOCS Score	141.50 (60-200)	200.00 (165-200)	<0.001‡
Patient index - Total patients in the ED†	26.50 (15-33)	27.50 (18-33)	0.502‡
Admit index - Total admits in the ED	14.60 ± 4.40	17.41 ± 4.48	0.002¤
Admit time - Longest admit times	74.52 ± 28.11	175.52 ± 47.42	<0.001¤
Registration time - Wait time for the last patient called (from triage)	10.00 (0-60)	18.50 (1-120)	0.008‡
Number of mechanical ventilators in use in the ED	0.50 (0-3)	3.00 (2-4)	<0.001‡

*FT: Fast-track
†ED: Emergency department
§NEDOCS: National Emergency Department Overcrowding Study
‡Mann Whitney U test
¤Student T-test.



*ED: Emergency Department
†FT: Fast-track
‡CTAS: Canadian Triage and Acuity scale category
§LWBS: Left without being seen.

Figure: Patient flow during the study periods.

(p=0.008). Even though the number of ambulance diversions was higher in Group 2, no statistically significant difference was observed between the groups (p=0.204).

The NEDOCS scores which were measured during the non-FT week were found higher compared to the FT week (p<0.001) (Table-4).

Of the NEDOCS scale parameters, there was a statistically significant difference in terms of admit index, number of mechanical ventilators in use in the ED, admit time and registration time, and all the components in Group 2 were found higher compared to the ones in Group 1 (p<0.003, p<0.001, p<0.001, p=0.008, respectively). In terms of patient index, no statistically significant difference was detected between the groups (p<0.502).

It was also indicated that having been discharged from ED, 2(0.80%) of the 249 patients presented to ED again within the first 72 hours of their discharge during the FT week and 2(0.83%) of 239 patients also presented in the same manner to ED during the non-FT week. Both patients' complaints who presented the second time during the first week were different than their initial complaints. However, both patients presenting again during the second week were renal colic patients and their complaints were the same as their initial complaints.

Three (1.20%) patients (2 acute appendicitis patients, 1 angioedema) required hospitalisation during the FT week and 1 (0.41%) patient who had humerus fracture needed hospitalisation during the non-FT week. During the studyperiod, no FT patients were exitus.

Discussion

In a study conducted in the ED of our hospital in 2008 by using the NEDOCS, it was revealed that we had Emergency Department Overcrowding (EDO) of a critical level.[2] However, that study did not offer any solutions for EDO. With our study, we aimed at finding whether or not FT practice could be a high-impact solution in EDO.

There exist several reasons for EDO that have serious negative effects on the quality of healthcare of emergency patients. Patients presenting to EDs, even though they do not require urgent care, are also considered one of the reasons for EDO. Especially in the 1980s and early 1990s, these patients were assumed to be the most important cause of EDO.[6] Despite the fact that these patients require no urgent healthcare, it is hard to determine the urgency or otherwise of their situation until the final diagnosis. EDs are responsible for taking care of this patient group as well. Today, ACEP suggests evaluation of patients with regard to their symptoms, not their final diagnoses.[1] In our study, 27% of the patients presenting to the ED was in the group with CTAS 4/5. This percentage was indicated as 30% in a study and as <%10 in another.[3,7] Three patients were hospitalised in Group 1 and 1 patient in Group 2. Even though these patients were classified as CTAS 4/5 based on their initial symptoms on presentation, with regard to their final diagnoses they were shown to have significant pathologic conditions. Besides, patients with triage score 4 and 5 also included those who needed urgent intervention in ED, even though they did not display life-threatening conditions. Renal colic patients present a good example of this category of patient. Yet the pain must quickly be alleviated. As ACEP suggests, the decision whether a patient does not require urgent healthcare cannot be made without examining a patient, it is therefore concluded that patients with CTAS 4/5 definitely have to be examined in the ED.[1]

In the study patients occupying EDs were among the important reasons of EDO since these patients failed to receive necessary primary healthcare in an unorganised health system. Particularly, family physicians cannot schedule timely appointments for their patients, thus they are referred to EDs.[8] In our study, when complaints of FT patients were analysed, it was observed that ENT diseases, minor trauma and orthopaedic problems accounted for the most frequent patient complaints. Patients unable to access polyclinics in a timely manner, prolonged periods of examination and treatment result in larger numbers of presentations of these patients to EDs. In order for the effective and fast treatment of the majority of these groups of diseases to be provided, particularly in primary healthcare system, and relevant polyclinics, sufficient administrative and structural solutions should be offered. In this way, we will greatly contribute to reducing EDO.

Various studies have shown that EDO increases LWBS rates.[4,6-8] Weiss et al. indicated that LWBS rate was directly proportionate to EDO when it was studied by the NEDOCS scale.[5] In the study including 30 hospitals, Stock et al. found that patients leaving without being seen were 4.2% on average.[9] In our study, patients leaving the ED without being seen during two weeks were found quite high with a rate of 15.6%.

Sanchez et al. indicated that FT practice decreased the number of patients leaving unexamined by a rate of 52.18%.[3] Darrab et al. also found that while the number of patients LWBS was 5% prior to FT, the number reduced to 2% by opening FT area.[4] In our study, we observed that FT lessened LWBS from 21% to 10%. Baker et al. reported that

presenting diseases of the LWBS patients worsened two times more than those in the control group.[10] Similarly, Monzon et al. stated in their study that one LWBS patient presenting with psychiatric complaint committed suicide.[11] In our study, we did not keep a record of triage scores of the LWBS patients and since follow-ups of these patients were not possible, we did not have results concerning these scores. However, given the fact that 4 (0.8%) patients with CTAS 4/5, who were included in the study, required hospitalisation, we assumed that LWBS patients were subject to serious health risk.

In this study, FT area improved ED effectiveness, measured by decreased WTs and LOS. FT also did not cause deterioration in the quality of care provided, measured by rates of mortality and revisits. We found that FT reduced the WTs by approximately 54.9% and a similar reduction of 50% was also mentioned in the study by Sanchez et al.[3] Again in the same study, it discussed a shortening of total LOS by 9.79% following FT and in our study this rate was found to be higher, which was 36,5%. Parallel to the findings in the study by Sanchez et al., we found no changes in the rates of mortality or revisits.[3] In various studies in the literature, it has similarly been reported that FT has shortened both WTs and total LOS in EDs.[4,12-14] Similar results were observed in another study regarding paediatric patients.[15]

In literature, it has been noticed that FT area is generally open at certain times of the day during which patient presentations are high, instead of 24 hours.[13-15] Only Devkaran et al. applied FT on a 24-hours basis in their study.[7] In our study, by opening FT area 24 hours, we endeavoured to determine the most convenient periods of time for FT. In our study, the number of patient presentation times was found statistically higher between 12:00-16:00 and 20:00-00:00 hours. In the study by Devkaran et al., the most crowded times were indicated between 18:00-06:00.[7] With regard to the findings, it was assumed that the most convenient time interval for FT was between 12:00 and 00:00 hours. This finding may vary according to geographic regions and hospitals.

We indicated in our study that FT increased patient satisfaction significantly according to the results of satisfaction survey. Even though many studies show a similar finding like ours, most of these studies do not particularly include patient satisfaction surveys and it is concluded in them that shortened WTs and LOS in EDs, and reduced LWBS rates result in an increase in patient satisfaction.[4,6,8,12] Nevertheless, few studies that are similar to ours in the way they use patient satisfaction surveys have similarly reported that FT increased patient satisfaction.[14,16,17]

Other than the study conducted by Kim et al., no scoring systems such as the NEDOCS was included in any previous study while examining the effects of FT on EDO.[18] Parallel to the finding of Kim et al., we also found a significant decrease in the NEDOCS score owing to FT practice. Of the five variable parameters of the NEDOCS, only registration time and patient index were considered to be affected by FT. In FT week, number of available hospital beds was more than non-FT week and more of patients in ED could have admitted to hospital beds so that admit time and admit index is found higher in the non-FT week. These parameters are regarded not to be affected by FT. The only reason for the NEDOCS score being low during the FT-week compared to the other week cannot solely be attributed to FT; other components which are not affected by FT are also considered to account for this result. However, we can conclude that FT contributed to the low NEDOCS score.

FT does not seem to be directly impact ambulance diversions because FT patients mostly consist of stable patients. But we think that FT may affect ambulance diversions indirectly. Overcrowding has many potential detrimental effects, including diversion of ambulances.[19] As FT contributed to the low NEDOCS score according to our results, we think that less overcrowding in EDs may cause less ambulance diversions. In the present study, ambulance diversions were less during the FT week, yet no statistical difference was observed between the two weeks. Being a single-centre study, our results may not be generalizable which is a limitation of the study. Fluctuation in attendance in different months of the year is obvious and our data in September may not be generalisable to the whole year. It also seems difficult to come to a precise conclusion regarding morbidity and mortality rates due to the brief study period and insufficient number of total patients.

Conclusion

Owing to FT, EDO was lessened according to the NEDOCS. Patient satisfaction increased owing to FT. No statistical difference was seen between FT and non-FT weeks in terms of morbidity, mortality, rates of patients being consulted and patient costs.

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