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Research on service process improvement based on basic industrial engineering

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Abstract. After statistics and analysis of existing service processes, it can be shown that there is much "wait "and irrational phenomena. Basic industrial engineering theory is applied to improve service process as well as program analysis to analyze and compare service indicators before and after optimization. The results show that the service efficiency can be improved after service process improvement based on basic industrial engineering.

Introduction

Medical service agency is a social organization, the input of which are patients to be output as healthy crowd through medical care of doctors and nurses, and supports from drugs and mechanical. However, when providing medical services for people, there are some irrational and often redundant links, which cause poor service process efficiencies, bring patients with psychological discomfort and result in harm to the interests of patients, and even endanger the lives of patients [1,2]. In this paper, business processes of a medical institution are industrial optimized based on engineering principles and methods to make their services more efficient, and further promote their service levels and patient satisfaction [3,4].

Process Investigation and Analysis

Firstly, outpatient procedure is investigated and analyzed. Outpatient process is as follows: Register → Visit the doctor for diagnosis → Prescription →Pay→ Get medicine (TCM or Western medicine).

(1) Register

Registration is the primary link to examination and treatment for patients, to determine the patient's basic information and where to obtain treatment. Briefly, registration is for a certificate of treatment. According to statistics, registration trouble is recognized as a problem for many patients.

(2) Waiting for treatment

From obtaining a certificate to receive medical diagnosis, service interruption often appears, most of which result from the conflicts between fewer doctors and more patients. Waiting is not only a waste of time, but also will cause the patient to become anxious.

(3) Paying

Payment is always needed throughout the treatment. Several service windows are open for payment according to different health care items in AF hospital.

(4) Get medicine

Medicine receipt is an essential part of a healthy physical and psychological recovery. In AF hospital, dispensary window is still queued, which exists in most hospitals. Receive one invoice and then give medication to patients, which is a waste of time and manpower.

For a more intuitive reflection of service process and operation, based on sample test and statistics analysis, treatment process are analyzed by using Program analysis, as shown in Table 1.

Table 1 Program analysis of treatment processes

Job Name：health care Start：enter the hospital End：leave the hospital Method：current method before optimization	Statistics			
	operate	frequency	Time (min)	Distance（m）
	○process	6	26	
	□check	1	5	
	→transport	8	10.5	255
	D wait	6	36.5	
	▽store	0		

Job description	Distance（m）	time（min）	Operate procedure				
			process	check	transport	wait	store
1 enter	10	0.5	○	□	→	D	▽
2 queue		5	○	□	→	D	▽
3 register		1	○	□	→	D	▽
4 walk for treatment	50	2	○	□	→	D	▽
5 wait		15	○	□	→	D	▽
6 treat		15	○	□	→	D	▽
7 walk for payment	50	2	○	□	→	D	▽
8 queue		5	○	□	→	D	▽
9 pay		1	○	□	→	D	▽
10 walk for check	50	2	○	□	→	D	▽
11 queue		0.5	○	□	→	D	▽
12 check		5	○	□	→	D	▽
13 walk for treatment	20	1	○	□	→	D	▽
14 treat & prescription		5	○	□	→	D	▽
15 walk for payment	50	2	○	□	→	D	▽
16 queue		5	○	□	→	D	▽
17 pay		0	○	□	→	D	▽
18 walk for medicine	15	0.5	○	□	→	D	▽
19 queue		6	○	□	→	D	▽
20 get medicine		3	○	□	→	D	▽
21 leave	10	0.5	○	□	→	D	▽

Treatment Process Optimization

Optimization of registration and payment. According to patient satisfaction surveys, patients are willing to accept the longest queuing timing is for 5 persons, more of which will cause anxious mood. The agency (AF hospital) has opened a total of four windows for registration and payment, which are a waste of time and manpower. Due to advancement of modernization and information, service can be optimized by the background database. Meanwhile, online registration for treatment appointment can be considered, which can eliminate the need for registration queuing, and can facilitate patient treatment time to avoid a collision with a focus on treatment. On the other hand, patient cases can also be recorded to avoid repeated handling records.

Registration and medical fees can be deducted directly by bounded with the bank card or Medicare card. The automated deduction of registration fee can reduce the miss of an online appointment to a certain extent. Online appointment-going for treatment can save time and reduce hospital workload.

With information technology application and process simplification, ultimately five service windows for registration and payment can be streamlined into two, one of which is set for the elderly and those patients who cannot use online appointment and payment.

Waiting. The above optimization can decrease the waiting concentration. However, widespread waiting still exists. Often seats are provided for waiting. If newspaper or entertainment magazine can be available for waiting patients to read, patient satisfaction can be improved with minimal cost.

(3) Get medicine

Due to the use of information systems, doctors input the prescription through computer, and the pharmacy will be able to synchronously receive the prescription information. Therefore, medicines or medical equipment can be prepared in advance, which can result in shorten waiting and reduced waiting queuing, and furthermore greatly enhanced service efficiency [5,6].

(4) Environment

Hospitals should post tips logo in a conspicuous location to facilitate physician-patient access. In addition, hospital environment should be fully in accordance with 5S standards (finishing (SEIRI), consolidation (SEITON), cleaning (SEISO), clean (SEIKETSU)) and enhance the people's literacy.

Treatment process after optimization is as shown in Table 2.

Table 2 Service process after optimization

Job Name：health care Start：enter the hospital End：leave the hospital Method：after optimization			Statistics			
			operate	frequency	Time (min)	distance （m）
			○process	5	21.5	
			□check	1	5	
			→transport	6	10.5	170
			D wait	1	1	
			▽store	0		
Job description	distance （m）	time (min)	Operate procedure				
			process	check	transport	wait	store
1 enter	10	0.5	○	□	→	D	▽
2 take ticket		1	○	□	→	D	▽
3 walk for treatment	50	3	○	□	→	D	▽
4 treat		15	○	□	→	D	▽
5 walk for check	20	1.5	○	□	→	D	▽
6 wait		1	○	□	→	D	▽
7 check		5	○	□	→	D	▽
8 walk for treatment	20	2	○	□	→	D	▽
9 treat and prescription		5	○	□	→	D	▽
10 pay		0.5	○	□	→	D	▽
11 walk for medicine	60	3	○	□	→	D	▽
12 get medicine		0.5	○	□	→	D	▽
13 leave	10	0.5	○	□	→	D	▽

Conclusion

By improvement, it can be seen that, the number of patients waiting has been reduced from the original six to one, moving distance from the original 255 to 170 meters, the entire treatment process time from 78 minutes down to 38 minutes with greatly improved efficiency, reduced unnecessary hospital staff mobility and reduced the patient treatment time.

Basic industrial engineering theory is an effective tool for service processes improvement and efficiency increasing, which is very widely used in manufacturing industry with remarkable success. However, application in service industry is still in infancy. This paper analyzed the service processes of an agency and found that there exists great space for improvement in many ways. On the basis of industrial engineering, the service are optimized comprehensively after simplifying the cumbersome procedures and information technology application with significant savings in treatment and waiting time, service quality and patient satisfaction improvement by making full use of hospital resources for greatly improved service quality and efficiency.

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