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Efficiency Improvement of Dentistry Clinics: Introducing an Intervening Package for Dentistry Clinics, Isfahan, Iran

Hamed Alaghemandan, Mohammad H. Yarmohammadian[1], Elahe Khorasani[2], Sobhan Rezaee[3]

Department of Medical Sciences and Health, Engineering Research Institution of Natural Disaster Management, Shakhes Pajouh, Isfahan, Iran, [1]Health Management and Economic Research Center, Isfahan University of Medical Sciences, Isfahan, Iran, [2]Department of Healthcare Management, Isfahan University of Medical Sciences, Isfahan, Iran, [3]Department of Social Studies, Iranian Institute for Social and Cultural Studies, Ministry of Science, Research and Technology, Tehran, Iran

Correspondence to:
Sobhan Rezaee,
Department of Social Studies, Iranian Institute for Social and Cultural Studies, Ministry of Science, Research and Technology, Tehran, Iran.
E-mail: sm.rezaee@yahoo.com

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Original Article

ABSTRACT

Background: In Isfahan, the second metropolitan in Iran, there are 1448 dentistry treatment centers that most of them are inefficient. Today, efficiency is the most important issue in health care centers as well as dentistry clinics. The goal of this research is to investigate the affordability and efficiency of dentistry clinics in Isfahan province, Iran.

Methods: The current work is a quantitative research, designed in three methodological steps, including two surveys and experimental studies, for understanding current deficiencies of Iranian dentistry clinics. First, we ran a survey. Then, we analyzed the results of the questionnaires which guided us to find a particular intervening package to improve the efficiency of the clinics. At the second step, we chose an inefficient clinic named Mohtasham (Iran, Isfahan) to evaluate our intervening package.

Results: Based on what the interviewees answered, we mention the most important issues to be considered for improving the efficiency of dental clinics in Isfahan. By considering mentioned problematic issues, an intervening package was designed. This intervening package was applied in Mohtasham clinic, since June 2010. It improved the clinic's income from 16328 US$ with 4125 clients in 2010, to 420,000 US$ with 14784 patients in 2012.

Conclusions: The proposed intervening package changed this clinic to an efficient and economic one. Its income increased 5.08 times and its patient's numbers grew 4.01 times simultaneously. In other words, Mohtasham's experience demonstrates the reliability of the package and its potentiality to be applied in macro level to improve other dentistry clinics.

Keywords: Advertising, dentistry clinic, efficiency improvement intervention

INTRODUCTION

As health care costs are increasing each day, healthcare organizations are faced with the challenge of delivering good quality of care at reduced costs.[1-3] Meanwhile dentistry has a remarkable position. It departs from other health professions

because in spite of government's involvement, its market has left mainly private.[4]

Dental care is an area of health care that has been divided from the rest of medical care in terms of financing and delivery of care.[5] However, delivery of dental care is more complicated than this.[6,7] In general, individual's demand for health care is unexpected and they may not inevitably know much about the quality of services.[6,7] These aspects do not exist in dental care. First, number of dental diseases is comparatively few and their happening is more probable. Second, individuals usually experience the same dental procedure several times and thus are able to learn from experience about the quality of service. Third, there is likely a wider variety of different treatments accessible to cure a given disease than in most other conditions. Forth, there are extensive feasible prevention methods. Fifth, with the exception of dental accidents and toothache, dental care is seldom "emergency" care. Because of this the individual can more openly plan for time treatment.[6] Accordingly, most of the dental clinics should think about their own performance in order to remain in competitive situations. So efficiency and quality plays essential roles in this regard. Further, "quality pressure" on dentists continues to enhance.[8-11] In an era of responsibility, the dental profession has to admit more accountability for poor quality care or unsteady result.[8,12] A broader description of quality, containing efficiency and timeliness, has currently been admitted.[13]

Quality and efficiency of care are main attentiveness of health care providers all over the world. An important element is satisfaction from the provided services. The most mentioned reasons for searching care in dental clinics are assigned to high quality service, concern for the patients' well-being and low cost of service.[14-16]

Feedback on satisfaction from dental care is essential for constant improvement of the service delivery and outcome.[17,18] It is essential that patients' attentiveness is dealt with properly. However, what patients want from the services may vary from what the provider thinks is best for them. Therefore, their view point should be included to provide a holistic view in increasing the understanding of the factors influencing patients' satisfaction with the health care setting. These contain directions such as patient–personnel interaction, technical competency, system efficiency and clinic's environment.[13,14]

Efficiency is the degree to which outputs are achieved in terms of productivity and resources allotted.[13] It is concerned with creating maximum production with the minimum input. Efficiency is all about optimizing the use of resources. To acquire maximum efficiency in terms of the cost, it is necessary to select the combination of effective inputs which produces the desired production at the lowest cost (cost efficiency).[19] Technical inefficiency exists when there is a deviation of production from the highest possible output. Usually inefficient production hints that actual expenses exceed the minimum costs of production.[6]

Measuring the efficiency of units offering health services where human life is concerned entangles the question of how to measure the efficiency of such units.[20-22] Hence, efficiency in the use of health care resources needs that those resources be employed in ways that make the greatest effect on the health of individuals.[23] Many of the researchers have investigated reasons for health care inefficiency.[24,25] From the literature, it is seen that these inefficiencies derive from three main sources: (1) Hospitals and other health organizations;[19,21,22,26-28] (2) clinical procedures;[29-31] and (3) administration.[32,33] Inefficient health care delivery may arise from any combination of these three sources.[24] The current paper will focus particularly on inefficiency of dental clinics.

There are several studies of efficiency within the dental sector.[6,19,34,35] Almost all have taken a policy viewpoint and are concerned with the system as a whole. Previous studies of dental efficiency have mainly used economic approaches and are concerned with comparability between the efficiency of different types of dental service.[19]

Dental efficiency research includes the functioning of dental care markets and how dental care costs can be contained through allotted decisions in production.[36] There is wide variability in the efficiency of clinics, as measured by the number of individuals treated per chair, across clinics and across areas. The reason for these variations could include differences in the work force numbers; clinic set-up (i.e., the number of chairs in the clinic); the number and features of patients seeking treatment; the relative complications of treatment needs, appointment

length and management; and the work practices of staff.[37]

One of the important goals followed by most healthcare organizations is to develop the quality and efficiency of their services and the extent to which its resources are put to good use.[28] Therefore, one basic reason to move up research into the efficiency of dentistry clinics is the need to set up the bases for the best use of resources in order to acquire patient satisfaction.

METHODS

This 3 level quantitative research has been designed in three methodological steps, including an experimental study and 2 surveys, as pre-test and post-test studies. It aims to understand current executive and medical deficiencies of selected dentistry clinics in Isfahan, Iran, based on clients' opinions. It also aims at designing and evaluating an intervening package for improving the efficiency of these treatment centers.

On the first step of the study, we ran a survey. A questionnaire was designed, which contained 14 closed questions in order to evaluate the quality of services in dental clinics. The first two questions were about the reason for referral to the dental centers and the way patients are introduced to centers. In next twelve questions, we asked patients to evaluate treatment services and staff proficiency through Likert scales which is used to obtain participant's preferences or degree of agreement with a statement or setting. Respondents were asked to indicate their level of satisfaction with a given statement by way of an ordinal scale. These 12 questions investigate reception and appointments scheduling, waiting time and waiting room, dentist proficiency and manner, assistant proficiency and manner, sanitation of the environment, costs and fees, post-treatment services, quality of services and overall management.

A total of 482 dental clinics' clients were interviewed in 4 selected polyclinics, Khanevadeh, Soroush, Mohtasham and Ghadir clinics, which belong to Darman Sanat Company, in Isfahan province, from 5 February 2010 to 5 March 2010. Geographically, these four clinics were in different zones with different social classes and covered about 100,000 patients/year. Since 1998, Darman Sanat Corporation provides access to services for all people needing dental health care in Isfahan province (Iran). Today it is one of the most important holding companies on dentistry clinics and offers all dental services through 4 dental clinics and a large group of professional dentists and assistants in Isfahan.

After finalizing the interviews, we analyzed the results and compared the clinics' scores and the research findings as well as their annual statistics on revenue, services and clients. These data guided us to find a particular intervening package for improving the efficiency of the clinics. This package has four distinctive parts: Advertising, staff training, developing medical team and promoting medical services. The package suggests;

- Improving the visibility of the clinic by installing visible clinic sign, distributing local paper advertisements, sending cell phone send text messages (short message service [SMS]) for potential clients, publishing a catalogue on introducing clinic and its medical services and signing contracts with insurances, governmental and private organizations and other institutions to recruit their members
- Holding training courses for staff about health issues, team working and hospitality and to follow-up their training by rewarding or punishing their acts
- Revising the services which are offered by the clinic and its medical and executive team. This includes improving the expert team by employing professional and experienced dentists and nurses, increasing the variety of treatment services such as implant services and reducing clients' costs in some possible services.

At the next step, we continued the research through an experimental study. We chose the most inefficient clinic, Mohtasham, in comparison to other three clinics, to evaluate our intervening package. At the beginning of the study, May 2010, the clinic had 5 inactive and 1 active dental unit, 2 executive staffs and 5 general dentists. 2 years later on May 2012, on the third research level, Mohtasham clinic was re-evaluated by the same questionnaire. 142 clients were interviewed and its annual economic circulation was reviewed to find the influence of the package on the clinic's situation in Isfahan dentistry treatment network.

RESULTS

On 2010, approximately 101805 patients entered these four clinics and their annual income was 2,613,028 US$ (Rial currency has been converted to US$ by the governmental rate). Table 1 presents an overview of the status of these 4 dental clinics.

Clinics

- Khanevadeh Clinic, the largest one in Darman Sanaat Company, covered about 70,000 clients in 2010. It consisted of 57 executive and medical staffs including 36 general and specialist dentists and 16 dental assistants. Approximately, its annual income was 1,580,000$
- Soroush clinic, the second largest dental treatment center, included 25 staffs, consisting of 8 general dentists, 7 specialists and 8 assistants. In 2010, it had 14080 clients and earned about 659,000$
- Ghadir dental center is located besides Kharrazi broad road in Isfahan city. It had 10 dentists for about 14000 patients and its annual income was more than 358,000 US$ in 2010. This clinic was working 24 h and also included a dental laboratory besides the treatment section
- Mohtasham clinic had only 1 active unit and some primitive equipment and attracted about one sixteenth patients of Khanevadeh dental center. It consisted of about five general dentists, no specialist, 3 assistants and 2 receptionists. Its annual income was about 16,328$.

Survey: Evaluating the current status of the dental clinics efficiency

On the first step, quantitative analysis demonstrates that dental restoration (42%) was the most chosen treatment in these clinics, then endodontic therapy and dental surgery was the next favorable selection. Checking up, as one of the primitive reasons for patients' referral to dental clinics, has the third place in this finding [Table 2].

Regarding clients' referral to dental clinics, about two-thirds of them were introduced by dental treatment centers through the insurances and other contracted institutions, including banks, factories, governmental and private organizations.

Table 1: An overview of the four dental clinic of Darman Sanaat Co. (March 2010)

Features of the clinics	Dental clinic			
	Khanevadeh	**Soroush**	**Ghadir**	**Mohtasham**
General dentists	23 People	8 People	7 People	5 People
Dental specialist	13 People	7 People	3 People	-
Dental assistant	15 People+a supervisor	7 People+a supervisor	5 People+a supervisor	3 People
Working time	12 h	12 h	24 h	16 h
Receptionist staff	6 People	2 People	2 People	2 People
Dental equipment	9 Active units	4 Active units	5 Active units	1 Active unit 5 Inactive units
	CSR, P.A Radio graphy, Store, Rest	CSR, P.A Radio graphy, Store, Rest	CSR, P.A Radio graphy, Store, Rest, laboratory	Store, Rest
Annual patients	69960 People	14080 People	13640 People	4125 People
Annual income	1,580,000 $	658,350 $	358,350 $	16.328 $

CSR=Corporate social responsibility

Table 2: Clients orders from dentistry menu

Clinics	Endodontic therapy and dental surgery%	Implant service, Denture, Prosthesis %	Orthodontics %	Dental restoration %	Checking up %
Ghadir	32	4	1	47	17
Khanevadeh	35	6	4	30	24
Soroush	33	5	11	36	15
Mohtasham	24	3	2	55	16
All (average)	31	5	5	42	18

Interpersonal communication and local accessibility were the two next important ways in choosing these clinics. This means that satisfied clients introduce the clinics to their friends and families and extend the clinics circles through their interpersonal communications, besides local clients. However, less than 5% of patients were attracted by local and SMS advertisements, which shows the clinics weakness in this kind of marketing strategy [Table 3].

Based on the results, client's attitudes to the clinics' services were measured. In general, it shows that Soroush dental clinic has the highest and Mohtasham clinic has the lowest score. In addition, three items, dentist manner, receptionist manner and the sanitary condition of the clinic took the highest scores. On the other hand, dental treatment price rate, post-treatments services and waiting time order had the lowest points in regarding to clients attitudes [Table 4].

Designing an intervention package for efficiency improvement

By this survey, we tried to understand the deficiencies and problems of the clinics and design an intervening package for improving the clinics' efficiency in dental treatment market.

Experimental study: Evaluating the intervention package

After designing the package, it was applied on Mohtasham clinic, which had the lowest score, to improve its efficiency and to evaluate the influence of the package on our treatment market. This intervention was begun on May 2010. Then, Mohtasham was reevaluated by the same questionnaire, on May 2012, through 142 closed interviews, as was discussed in the research methodology section [Table 5].

Regarding the clients' orders from the dentistry services, endodontic therapy, dental surgery, implant services and orthodontics therapy had grown significantly. In addition, dental restoration and checkup had a 40% share of the services [Table 6].

Furthermore, the importance of local accessibility was decreased after this intervention period and instead local and SMS advertisements attracted about one-fifth of the clients. Effects of contracted institutions and interpersonal communication also grew, as you can see in Table 7.

Table 3: Clients' introducing ways with clinics

Clinics	Contracted institutions %	Interpersonal communication %	Local accessibility %	SMS %	Local advertisement %
Ghadir	67	18	8	3	4
Khanevadeh	82	15	2	0	1
Soroush	56	30	10	1	3
Mohtasham	35	15	50	-	-
All (average)	60	20	18	1	2

SMS=Short message service

Table 4: Clients evaluation on clinics services

Clinics	Clients attitudes on: Quality of clinic services	Clinic management	Post treatments services	Dental treatment price rate	Clinic cleaning	Dental assistant proficiency	Dentist proficiency	Dentist manner	Waiting time/ waiting room	Receptionist manner	The reception operation
Ghadir	3.80	3.93	3.62	3.61	4.35	4.17	4.13	4.46	3.90	4.27	4.08
Khanevadeh	3.91	3.83	3.40	3.55	4.10	3.96	3.88	4.14	3.71	4.08	3.95
Soroush	4.29	4.21	3.82	3.56	4.88	4.14	4.34	4.58	4.10	4.80	4.55
Mohtasham	2.85	3.80	3.08	2.90	3.90	3.12	3.95	3.90	2.59	3.35	3.02
All (average)	3.71	3.94	3.48	3.41	4.31	3.85	4.08	4.27	3.58	4.13	3.90

In addition, the client's attitudes to Mohtasham clinic got better and the average score improved from 3.31 on May 2010 to 4.07 on May 2012. Paired *t*-test indicates significant ($P < 0.05$). Mean ± standard deviation for before and after the intervention was 3.31 ± 0.81 and 4.07 ± 0.64 respectively and *t* value was 5.2 [Table 8].

DISCUSSION

The package has four particular parts: Advertising, staff training, developing medical team and improving medical services. Efficiency of dental clinics can be enhanced with good scheduling techniques and other effective management practices. In clinics that are deluged with patients, the only realistic and lasting solution is to combine efficient clinical practices with enough resources in the form of facility size and dental staff.[13]

One of the recommendations of the intervention package was improving marketing in order to decline deficiency. Actually, competition is an important policy for promoting productivity and efficiency in the dental part that showed how this new management strategy, called "market management" has been influential within the dental centers.[18] Also, the American Dental Association's Special Committee on the Future of Dentistry report stressed on adoption of "modem methods of marketing dentistry" in order to turn the existing inactive need for dental care into an active demand. Marketing should be addressed to the various population groups in keeping with their ethnicity, cultural level, economic status and behavioral changes in life-style.[38] In addition, advertizing by orthodontists has persuaded many

Table 5: New features of Mohtasham dental clinic (May 2012)

Features of the clinic	Information
General dentist	14 people
Dental specialist	11 people
Dental assistant	10 people+a supervisor
Working time	16 h
Receptionist staff	3 people
Dental equipment	6 active units
	Csr, P.A radio graphy, store, rest
Annual patients	14784 people
Annual income	420,000 $

Table 6: Clients orders from dentistry menu in Mohtasham dental clinic (2012)

Clinics	Endodontic therapy and dental surgery %	Implant service, denture, prosthesis and	Orthodontics %	Dental restoration %	Checking up %
Mohtasham (2012)	35	13	10	32	10
Mohtasham (2010)	24	3	2	55	16

Table 7: Clients introducing ways with Mohtasham dental clinic (2012)

Clinics	Contracted institutions %	Interpersonal communication %	Local accessibility %	SMS %	Local advertisement %
Mohtasham (2012)	45	29	8	5	13
Mohtasham (2010)	35	15	50	-	-

SMS=Short message service

Table 8: Clients evaluation on Mohtasham dental clinic (2012)

Clinics	Clients evaluation on											
	Average	Quality of clinic services	Clinic management	Post treatments services	Dental treatment price rate	Clinic cleaning	Dental assistant proficiency	Dentist proficiency	Dentist manner	Waiting time/waiting room	Receptionist manner	The reception operation
Mohtasham (2012)	4.07	3.95	3.97	3.53	3.53	4.27	4.15	4.15	4.50	3.94	4.59	4.20
Mohtasham(2010)	3.31	2.85	3.80	3.08	2.90	3.90	3.12	3.95	3.90	2.59	3.35	3.02

men and women in their twenties and thirties and beyond, that it is fashionable to have orthodontic services to improve their appearance. The practice of dentistry is being transformed, as a result of advertisement and commercialization.[39]

The ability to manage missed appointments was recognized as a factor that can compromise efficiency and jeopardize the financial supportability of the clinics.[40] For improving efficiency the delivery of dental services must evolve with the changing needs and demands of a society. Flexible hours, variety of places and just about anything that will motivate increased use of services can and should be employed. The ability to attract and retain qualified practitioners will be in relation to the economic return and many incorporeal humanistic rewards from the provision of the needed health service.[39] To improve the efficiency, all available options should be implemented for increasing the clinics and staffs to levels that better match the population.[13]

In our research we mentioned that the expectations of patients are so important in improving the efficiency. Patients' satisfaction with the dental care is crucial because it will affect their pattern of service utilization.[14] A study also reported that the common expectations and opinions of elderly people influence their demand for dental treatment. Barriers to seeking care include cost, fear and immobility, the emotional obstacles of being 'too old' or "not worth bothering about" and not knowing where available services are.[41]

Dentist–patient interactions during dental treatment have been demonstrated to affect patients' compliance with treatment and scheduled visits. Therefore, asking feedback from patients' is essential for properly evaluating the given services.[14] Rankin and Harris reported that patients dislike having a dentist who begins treatment without any description.[42] Patients have been shown to have assurance in dentists who are friendly, kind and who take time to describe procedures.[43]

The literature on the dentist-patient relationship provides some clear advice about patients' expectations and perceptions when visiting a dental practice. These suppositions are more related to the attitudes and communication skills. In particular patients want a dentist who listens to them, has a friendly caring attitude, explains treatment viewpoint and procedures and inspires confidence. This is consistent with research findings which indicate that the most significant health service factor influencing patient satisfaction is the quality of doctor-patient relationship. Several studies have described perceived features of dentists that are likely to increase care-seeking or fulfillment with care, including communication skills, informing patients about treatment options and dental teams' behavior during dental visits.[43,44]

Sintonen indicated that the number of hours spent at work without treating patients was one of the most important reasons explaining the 14% lower productivity of public compared with private dentists in Finland.[45]

Dental workforce is one of the significant resources of health care.[46] In a study, a dental clinic provided a teaching program; including many of the newest dental developments to improve its human resource performance.[47] Another study reported that professional training courses can improve the staff employed in public dental clinics to provide better quality of care to patients.[37]

As labor expenses are an important variable on clinical efficiency, substitution of some of dentists with cheaper workforce is advised as one way to improve the efficiency of dental care.[19] Wallace pointed out that they can often hire part-time or on-call staffs who continue regular employment in private practices. However, they find it challenging to retain full-time eternal dental staff.[40]

In a study by Linna *et al*. represented that average level of cost inefficiency was estimated to lie between 20% and 30%, which suggests that improving the overall efficiency of dental health centers could theoretically reduce costs by 0.3-0.4 billion US$.[36] In relation to dentistry for adults, comparisons were made between the public and private sectors, which suggested that the private sector was superior in terms of productivity.[18]

There is an increased attention on financial matters and productivity. In countries major changes have happened in management doctrines. It involves joining the traditional public-administration and market models also customer orientation, management by targets, internal competition and decentralization.[18]

Sintonen measured the productivity of dentists and found that on average the productivity of public dentists was higher than private dentists

but the difference was not significant.[48] Jonsson compared the productivity of private and public dentists. The results suggested that apart from the first productivity measurement, private dentists were more productive than public ones.[49] Nordblad *et al*. (1996) used data envelopment analysis to estimate technical efficiency in public health centers in Finland. The results suggested that there was a large difference in technical efficiency (from 0.44 to 1) in dental care provided by the Finnish health service.[50]

CONCLUSIONS

In short, the intervention package improved Mohtasham clinic income from 16328 US$ with 4125 clients on 2010, to 420.000 US$ with 14784 patients in May 2012. By implementing this intervention package, we managed to improve the efficiency of this clinic. Its income increased 25.72 times and at the same time the number of patients grew 3.58 times. In other words, Mohtasham experience indicates the reliability of the package and demonstrates its potential to be applied in macro level for improving the efficiency of other dentistry clinic. In conclusion, this research demonstrates the efficacy of the intervention package in improving the efficiency of dentistry clinics.

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