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Induced Demand after Implementing the Health Reform Plan in Selected Emergency Departments Affiliated to Isfahan University of Medical Sciences: a Cross-Sectional Study

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Abstract

Introduction: Exactly recognizing the effect of health reform plan (HRP) in emergency departments (EDs) is crucial given the large portion of budget assigned to this plan and the effect of introducing this plan on inducing demand and the associated potentially-unbearable costs.

Objective: The present study was conducted to assess the demand induced after implementing the HRP in the selected EDs of Isfahan University of Medical Sciences, Isfahan, Iran.

Method: The present quantitative and descriptive study collected data related to certain emergency services, performance indicators and working hours of emergency staff using a researcher-made checklist and based on hospital records and information in the years before and after implementing the HRP in Iran, i.e. 2013 and 2015. The data collected were analyzed in SPSS-21.

Results: The obtained results suggested significant increases in emergency admissions (69.97%), radiographic images (65%), clinical tests (27.27%) and specialist visits (69.95%). Significantly increases observed in the performance indicators in the ED included the mean hospitalization duration by 61.14%, the bed occupancy rate by 15.71% and the working hours of the nursing staff by 11.43% and those of emergency medicine specialists by 44.72% in the first year after implementing the HRP compared to in the year before the implementation.

Conclusion: Although implementing the HRP in Iran significantly changed the performance indicators in the ED, certain infrastructure such as human resource management and the increased demand are considered the main time-consuming and costly challenges in EDs.

Key words: Emergency Service, Hospital; Health Care Reform; Health Care Sector; Iran

INTRODUCTION

Developing countries have recently sought to renovate their healthcare system to provide more people with proper access to justice, quality and fair payments in the system (1). Countries such as China, Turkey, Australia and the US have already reformed their health system in terms of the cited dimensions (2). The HRP began to be implemented in Iran from May 15, 2014 to improve the level of public health, reduce patient self-payment and develop and promote community health indicators (3). Despite its benefits, the HRP in Iran has been faced with different challenges, mainly including huge governmental budget requirements and induced demand (4, 5). Induced demand has been considered a major issue in health economics since 30 years ago, and it refers to an increase in the

unnecessary services delivered to health system clients by service providers (6). Different economic and structural factors as well as the behavior of service providers and service recipients and their information asymmetry can affect induced demand. Induced demand plays a key role in health policy making by affecting paraclinical, therapeutic, surgical and pharmaceutical services (7). Demand appears to have been induced in Iran as a result of introducing certain objectives of the HRP such as increasing the patient insurance coverage, decreasing the patient share of treatment costs and improving public access to treatment and specialized medical services (3).

The ED is considered a vital ward in a hospital given its highest number of admissions compared

Table 1: The mean values of emergency services before and after implementing the HRP

Variable	2012-13	2015-16	Difference (%)	Mean difference	Standard deviation	P
Emergency service						
Admissions (patient)	1765	3000	69.97	1235	270.11	0.001
Radiographic images (image/person)	0.02	0.33	65.00	0.13	0.08	0.010
Clinical tests (test/person)	0.66	0.84	27.27	0.18	0.06	0.001
Visits (month)	1148	1951	69.94	803	175.51	0.002
Performance indicator						
ED length of stay (hour)	8.75	14.10	61.14	5.35	2.55	0.004
Bed occupancy rate (%)	78.30	90.60	15.71	12.31	1.63	0.000
Working hour						
Nurse (hour/person)	108.60	121.02	11.43	12.42	6.20	0.002
Emergency medicine specialists (hour/person)	310.28	449.05	44.72	138.77	98.12	0.001
Number of staff						
Nurse (person)	200	235	17.5	35	10.19	0.000
Emergency medicine specialists (person)	14	19	35.71	5	2.5	0.001

to that of other units (8). As the heart of healthcare systems, EDs face many presentations and should serve all patients irrespective of their clinical problem and treatment needs. Improving the status and organization of the ED should be therefore considered a priority of the HRP (8, 9). The diverse services provided in EDs require huge amounts of budget. The financial losses associated with induced demand are reflected in government healthcare subsidies (10). Given the major challenge of the demand induced in EDs, exactly recognizing induced demand and its dimensions and effects on providing services, especially in ED, is crucial. The present study was therefore conducted to determine the degree to which implementing the HRP affects induced demand in the hospitals covered by the HRP in Iran.

METHODS
Study design
The present cross-sectional study was conducted in one year before and one year after implementing the HRP, i.e. May, July, September and November 2012 and January and March 2013 and the same months in 2015-2016, in the ED of Al-Zahra Hospital, Isfahan, Iran. The present study was approved by the Ethics Committee of Isfahan University of Medical Sciences (Ethical Code: IR.MUI.REC.1396.3.636), and one of the authors obtained permission for conducting the study from the head of the hospital and the authorities of the relevant units.

Study population
The study population comprised the nurses and emergency medicine specialists working in the ED when performing the study. All the documents recorded in relation to the patients admitted to the ED during the study period were reviewed. Distorted or incomplete data were also excluded.

Data collection
The data were collected using the census method. The data related to the indicators were monthly available in the hospital manager system and collected using a data collection tool developed by the researcher and approved by the experts and manager of the hospital. The indicators of induced demand assessed in the present study included the ED length of stay, the bed occupancy rate in the ED, the numbers of radiographic images and lab tests performed per patient, the number of visits by the specialists during hospitalization in the ED and sum of the monthly working hours of the emergency nursing staff and emergency medicine specialists. Data were collected through the face-to-face presentation of the researcher to the intended units and assessment of the electronic records associated with the patients hospitalized in the study period. To avoid bias in the data, in addition to the researcher, another person blinded to the study procedure completed the study checklist, and the data collected by both the researcher and the external observer were compared with each other.

Statistical analysis
The data were analyzed, the relationships among the performance indicators were determined and induced demand was assessed in SPSS-21 using the paired t-test. P-value < 0.05 was set as the level of statistical significance.

RESULTS
The number of active beds in the ED was 88 in the pre-HRP period and 107 in the post-HRP period. After implementing the HRP, approximately ten bed were possible to be added to this unit in emergency situations. Two hundred nurses and 14 emergency medicine specialists were working in the ED during the pre-HRP period, and 235 nurses

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and 19 emergency medicine specialists during the post-HRP period.

Table 1 presents the mean values of emergency services before and after implementing the HRP, suggesting increases in all the components of emergency services in 2015 compared to in 2013, including admission rate by 69.97%, radiographic images by 65%, paraclinical tests by 27.27% and the number of visits by 69.95%. The mean ED length of stay also increased by 61.14%, and the bed occupancy rate by 15.71%. Moreover, the mean monthly working hours in person-hour increased by 11.43% for the nurses and by 44.72% for the emergency medicine specialists in 2015 compared to in 2013.

The obtained results suggested significant differences in the study components between one year before (2012-2013) and after (2015-16) implementing the HRP (P<0.05).

DISCUSSION

The present study was conducted to investigate induced demand in the ED of a teaching hospital after implementing the HRP in Iran, and thereby to provide managers with actual data required for appropriately allocating hospital resources and equipment. The obtained results suggested increases in the components of emergency services in the first year after implementing the HRP compared to in the year before the implementation, which is consistent with a study by Faridfar et al. (2016) finding that reported an increases in admission rates in Rasoul-e-Akram general hospital in Tehran, Iran after implementing the HRP, and also with a study by Emamgholipour et al. (2017) suggesting post-HRP increases in emergency admissions to all the hospitals affiliated to Tehran University of medical sciences, and Iran University of Medical Sciences (11, 12).

The increase in presentations appears to have been caused by reductions in treatment and diagnostic costs and patient out-of-pocket payment and improvements in insurance coverage after implementing the HRP. The shift of patients from the private to the public sector also appears to have caused an increase in presentations and admissions to EDs. Increases in monthly admission rates in the year after implementing the HRP suggested an increase in demand in the selected ward, which was reflected in an increase in the mean monthly frequency of specialist visits in the ED. Increases in presentations to public hospitals, providing patients with free-of-charge access to specialists during their hospitalization, Relative Value Based Services tariffs (K) and performance-based payment system after the HRP appear to contribute to increasing the frequency of specialist visits. Increases in specialist visits after implementing the HRP therefore showed induced demand in the selected ward. Mosadeghrad et al. argued that unrealistic increases in tariffs induced demand in service recipients for health services (13). Lien et al. (2004) found an increase in the number of specialists and skilled personnel to induce demand, and the number of competitors in the health market to be an effective variable (14).

The results revealed an increase of 27.27% in the mean frequency of daily clinical tests and an increase of 65% in radiographic images per person due to increases in admission rates, patients' willingness to use free-of-charge services, demands placed on health service providers for providing more services, specialist visits and probably the hospital income and improvements in insurance coverage and the performance-based payment system, all of which suggest induced demand. Bardey and Lesur (2006) found increases in demand for health services and increases in the financial benefit of health service providers by increasing diagnostic tests and prescribing expensive tests associated with the introduction of the performance-based payment system (15). Iversen (2004) found doctors to tend to increase demand and provide more services for each patient if their income per patient is increased (16). Keyvanara et al. (2014) found taking out complementary insurance to improve access to expensive diagnostic services and increase the likelihood of significantly inducing demand for unnecessary services (7).

The mean ED length of stay increased from 8.75 to 14.10 hours during the first year after implementing the HRP compared to in the year before the implementation. Reductions in the percentage of the fee paid by patients were found to increase patient willingness for prolonged hospitalization and the number of patients presenting to EDs, making these units more crowded during the study period after the HRP and prolonging the mean hospitalization duration. In addition, significant increases in unnecessary and non-emergency paraclinical requests in this ward can contribute to increasing the mean hospitalization duration after implementing the HRP. In line with the present study, Bastani et al. obtained undesirable hospitalization durations in medical centers after implementing the HRP (17). In fact, prolonged hospitalization in EDs causes problems in providing services given the provision of high-quality services in the shortest possible

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time as the main task of EDs. Prolonged hospitalization of individual patients in EDs also decreased the quality of services provided for other patients and caused their dissatisfaction and increased losses in events (3). Khazaei et al. found prolonged hospitalization and delayed medical service provision in EDs to decrease the quality of care and increase undesirable outcomes in patients with life-threatening conditions (18). Moreover, prolonged hospitalization can increase costs and financial pressure on insurance companies and families.

Given the standard and optimal bed occupancy rate of at least 70% recommended by the Iranian Ministry of Health and Medical Education, the mean bed occupancy rate of 78% in 2013 and 93% in 2015 suggested the adequate and efficient utilization of available beds in the selected ED. Bastani et al. also found a mean bed occupancy rate of 73% before implementing the HRP and 75.3% after the implementation to suggest adequate utilization of available beds in selected medical centers, which is consistent with the results of the present study (17).

Increases in the bed occupancy rate in public hospitals was natural after implementing the HRP, which was followed by decreasing patient payment in public hospitals, increasing the patient insurance coverage and subsequently shifting patients from the private to the public sector. Faridfar et al. (2016) reported increases in the workload of a hospital after the HRP, as reflected in a significant increase in the bed occupancy rate in the present study (11). Furthermore, reducing patients' share of the fee was associated with increases in their tendency towards longer hospitalization in EDs and positive responses of physicians without real needs for this request. The longer hospitalization duration in the ED increased the bed occupancy rate. Increases in the bed occupancy rate was therefore partly correlated with increases in the mean hospitalization duration, which showed induced demand after implementing the HRP.

The present findings suggested increases in the mean total monthly working hours per person of the nursing staff and emergency medicine specialists in the first year after the reform plan compared to in the year before introducing the plan. Increases in the mean admission rate, mean hospitalization duration and bed occupancy rates increased the mean total monthly working hours, overtime and workload of the nurses and emergency medicine specialists. According to Ghorbani-Nia et al. (2017), nurses reported increases in their working hours and workload

after implementing the HRP and the associated shift of patients from the private to the public sector disregarding any changes in nursing staffing (19). Nakhaei et al. (2017) reported increases in the workload of treatment teams as a result of increases in presentations to hospitals, and in the bed occupancy rate as a result of implementing the HRP (2).

The term "induced demand" was used as a general concept in the present study. Further studies are recommended that be conducted to exactly determine the increases in demand for services associated with the HRP, which manifest themselves as increases in admission rates, radiographic images, clinical tests, specialist visits, mean hospitalization duration, bed occupancy rate and working hours of emergency personnel, reductions in the service quality and potential increases in complications. Future researchers are also recommended that address the cost related to the effectiveness of the HRP. Moreover, health policymakers and directors are recommended to take measures to improve efficiency and more effectively allocate the resources.

Limitations
The present study limitations comprised failure to evaluate the hospital changes made during the study period, including the physical development of the ED and increases in the number of medical students.

CONCLUSIONS
Significant increases were observed in the mean monthly admission rates, number of radiographic images, clinical tests, specialist visits, the mean ED length of stay, the bed occupancy rate and the working hours of the emergency personnel during the first year of the HRP implementation compared to the year before the implementation.

AUTHORS' CONTRIBUTION
All authors have, fully or partly, been involved in the concepts and design of the study, collecting the

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data or preparing the manuscript. In addition, all have reviewed the manuscript.

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