



## Original Article

# The hospital performance indices after implementing the Universal Health Coverage in the Iran

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## Abstract

**Background:** The health sector evolution plan (HSEP) was implemented in 2014 in Iran. The aim of present study was to evaluate the hospital performances indices after implementing the second phase of universal health coverage (UHC) comparing to before.

**Methods:** In a cross-sectional study in 2019, the data of 58 hospitals were gathered from database in Statistics' office in clinical deputy of Isfahan University of Medical Sciences (MUI), from 3 years before HSEP implementing to 3 years after that, between 2011 and 2017. Sampling was performed as census method. The data including the inpatient bed count in different type of hospitals (public hospitals affiliated to MUI, not for profit hospitals affiliated to the Social Security Organization (SSO), hospitals affiliated to military organizations, private and charity hospitals), the Bed occupancy rate (BOR), number of inpatients annually and the average length of stay (ALOS) in hospital, were collected and analyzed.

**Results:** By comparing to before carrying out the HSEP, the available beds, particularly in private hospitals was increased significantly (83.22%) after implementing the HSEP. Moreover, the number of hospitalized patients was raised after HSEP, in a way that, the highest percentages have been seen in charity hospitals and private hospitals with the growth rates of 140% and 69.44% respectively. Also, the longest ALOS was seen in public hospitals as likely as 3.4 days.

**Conclusion:** Following the implementing the HSEP, although the available beds and hospitalization rate have been increased significantly, however, the BOR and the ALOS have not been raised markedly.

**Keywords:** Bed Occupancy; Hospitalization; Length of Stay; Universal Health Insurance.

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## Introduction

Financial risk protection particularly against catastrophic health expenditures is one of the main purposes of health system reform (HSR) in many countries. In spite of indicating several differences, Universal health coverage (UHC) and any other policies that launched to reduce co-payment which have been to paid by patients, are seen in HSR projects in many different countries (1). Based on world bank's report, the out of packet payments was more than 54% at the point of service delivery in Iran. This high

percent out of packet payment was considered as one of the factors encountered people to catastrophic health expenditures and consequently it predisposes them to poverty (2). According to Article 38 of the Fifth Economic and Social Development Plan of Iran, UHC was introduced with approaches such as promoting equity in access to health services and reducing the health costs for low-income and vulnerable households (3). Naturally, following decreasing financial obstacles particularly for poor peoples, the

demands for unmet health services would be increased (4).

The first phase of UHC in Iran was implemented in villages and small towns (with less than 20000 inhabitants) in 2005. The second phase of UHC in Iran that was called as health sector evolution plan (HSEP) was implemented in Iranian's health system in other cities in May 2014. During implementation of the HSEP, near 10 million peoples were under coverage of insurance. For financial risk protection of Iranian's citizens from out of pocket payments, inhabitants from medium and large sized cities have to pay up to 10% and inhabitants from small sized cities and villages still have to pay up to 5% of inpatients health costs at the start of the project. Subsequently, franchise fee was reduced to 6% and 3% in large & medium sized cities and rural areas respectively. The HSEP focused on decreasing inpatients costs in public hospitals primarily. The preliminary data indicated the reducing out of packets for hospital cares to 32.8 % of in following year of HSEP implementation (5).

According to previous comprehensive study on the utilization rate of health services in Islamic Republic of Iran in 2002", 6.4% of people living in urban areas needed to be hospitalized and 5.6% of them and finally used hospitalization services for the first time. It should be mentioned that these indicators in rural areas are as follows; 6% and 4.9 % respectively (6). The published reports indicated that the average length of stay (ALOS) in Isfahan hospitals was about 4 days and the inpatient bed occupancy rate in the mentioned hospitals was 75 % in 2006 (2). Consequently, evaluating each plan carried out in health care delivery system in terms of achieving predefined objectives as well as efficiency of the plan is considered as a significant issue. Thus, the current study, which was conducted to investigate some hospital performance indicators and the number of

hospitalized patients in hospitals that covered by MUI during the years of 2011 through 2017.

### Methods

This is a cross sectional study that was performed in 2019, based on ethics code No. IR.MUI.MED.REC.1397.104 from research and technology deputy of MUI. The current study was conducted to investigate the trend of some performance indicators in hospitals that covered by MUI between 2011 and 2013 (three years before implementing the UHC), 2014, and between 2015 and 2017 (three years after carrying out the UHC).

The data were gathered from a database in statistics office in clinical deputy of MUI on the basis of census sampling method. In Isfahan province, there were 21 districts that covered by MUI, and in these districts, there were 58 hospitals that include: 41 public hospitals that affiliated to MUI, 4 hospitals affiliated to the Social Security Organization (SSO), which are non-governmental and non-for-profit hospitals, seven private hospitals, four charity hospitals, and two hospitals affiliated to military organizations. But those hospitals located in Kashan, Aran and Bidgol districts were not included in this study, since those hospitals covered by Kashan University of Medical Sciences.

Data collected based on researcher-made checklist. The variables in checklist including: type of hospital (public, private, charity, affiliated to SSO, and affiliated to military organizations), the available beds, the bed occupancy rate (BOR), the number of hospitalized (admitted) patients, and the average length of stay (ALOS) per every admission in every year.

Data were reported via descriptive statistics such as number, relative frequency, mean and standard deviation, and was analyzed by SPSS software version 16 using independent T test.  $\alpha < 0.05$  was considered significant.

Table 1. The number of available beds in hospitals covered by MUI before and after implementing the UHC in 2014

Type of Hospital	2011 N (%)	2012 N (%)	2013 N (%)	2104 N (%)	2015 N (%)	2016 N (%)	2017 N (%)	Difference in hospitalization in 2017 versus 2011 (%)
Public	4008 (64.57)	3938 (63.93)	3928 (68.88)	4024 (64.56)	4114 (64.31)	4334 (64.56)	4755 (65.91)	18.6
Social Security Organization	821 (13.23)	804 (13.05)	323 (5.66)	909 (14.58)	914 (14.29)	904 (13.47)	863 (11.96)	5.11
Military's Organizations	623 (10)	623 (10.11)	647 (11.34)	278 (4.46)	296 (4.63)	307 (4.57)	314 (4.35)	49.6-
Private	483 (7.78)	495 (8.04)	495 (8.68)	663 (10.64)	653 (10.21)	784 (11.68)	885 (12.27)	83.22
Charity	270 (4.38)	300 (4.87)	310 (5.44)	359 (5.76)	420 (6.56)	384 (5.72)	397 (5.51)	47
Total	6207 (100)	6160 (100)	5703 (100)	6233 (100)	6397 (100)	6713 (100)	7214 (100)	16.22

### Results:

The number of available hospital beds in hospitals that covered by MUI in 3-year interval after UHC increased significantly in private and charity hospitals as 83.22 % and 47% respectively in comparison of 3-year interval before UHC implementation ( $t= 15.177$ ,  $df= 44625$ ,  $P$  Value= 0.000). But on the contrary, the available beds in military organizations reduced 49.6% due to the closure of a hospital. However, the available beds in public hospitals remained about 65 % during these periods (Table 1). The number of hospitalized (admitted) patients was raised from 513464 to 712400 in 2011 and 2017 respectively. So, the number of hospitalized patients has raised 38.7% after UHC significantly ( $t= 351.765$ ,  $df= 4225918$ ,  $P$  Value= 0.001). Considering the population that covered by

MUI as 4458532 and 4652854 in 2011 and 2017 respectively, the rate of hospitalization in MUI's hospitals was raised from 115.16 to 153.1 per 1000 inhabitants in 2011 and 2017 respectively.

After carrying out the UHC, the highest relative frequency of hospital admissions was seen in charity and private hospitals with the growth rate of 140 % and 69.44 % respectively. In contrast, the lowest increase of hospital admissions percentage was identified in SSO which was 6.99 % as were shown in Table 2. Moreover, hospitals affiliated to SSO have constantly had the highest BOR (68.1 % -74.96 %), whereas the lowest BOR has been reported in charity hospitals (41.67 % - 44.94%) as listed in Table 3. The BOR in public hospitals affiliated to MUI was not differed

Table- 2. The number of hospitalized patients in hospitals covered by MUI before and after implementing the UHC in 2014

Type of hospitals	2011	2012	2013	2014	2015	2016	2017	Difference in hospitalization in 2017 versus 2011 (%)
Public	291657	287559	308669	341597	350184	366999	413649	41.7
Social Security Organization	92040	90049	114897	104693	100919	98707	98478	6.99
Military's Organizations	51224	52954	37085	36658	38877	41951	68820	34.35
Private	55233	59437	80228	84535	84107	107926	93590	69.44
Charity	23110	26410	34048	39660	45709	48595	55466	140
Total	513464	516409	574927	607143	619796	664178	712400	38.7

Table 3. The mean ± standard deviation of the inpatient bed occupancy rate in hospitals covered by MUI before and after implementing the UHC in 2014

Type of hospitals	*2011	*2012	2013	2014	2015	2016	2017
Public	67.83	66.35	54.6 ± 23.61	56.28 ± 23.09	60.56 ± 23.39	59.22 ± 24.29	61.22 ± 21.92
Social Security Organization	68.1	68.12	70.87 ± 3.91	70.8 ± 4.1	74.45 ± 6.82	71.94 ± 4.91	74.96 ± 5.08
Military's Organizations	58.97	61.21	45.55 ± 26.54	59.68 ± 20.89	65.36 ± 15.23	63.95 ± 10.21	67.08 ± 6.53
Private	56.64	57.57	51.7 ± 11.31	52.27 ± 13.53	52.18 ± 17.92	53.96 ± 22.8	46.6 ± 16.43
Charity	50.93	55.53	41.67 ± 27.83	46.83 ± 31.34	47.83 ± 34.54	43.04 ± 30.48	44.94 ± 31.87
Total	60.49± 7.42	61.75 ± 45.4	64.5 ± 22.11	21.72 67.02 ±	71.32 ± 22.78	70.35 ± 23.5	69.23 ± 21.9

\* The standard deviations were not available.

significantly after UHC implementing to before that (P value = 0.084).

It should be also stated that the longest ALOS was seen in public hospitals on average 3.4 days. On the other side, the shortest ALOS was occurred in charity hospitals, which it has been decreased averagely from 2.13 days before implementing the UHC in 2011 to 1.41 days after UHC implementing in 2017. However, there was no significant statistical difference in ALOS in hospitals that covered by MUI after implementing UHC to before that. (t= -0.346, df= 78, P Value= 0.73). (Table 4).

**Discussion:**

In accordance with the results of the present study, the number of available beds has been reached to 7214 beds in hospitals covered by MUI in 2017. Considering number of populations covered by MUI as likely as 4652851 persons in 2016, the per

capita available beds in the population supported by MUI was estimated 1.55 bed per 1000 inhabitants. The lowest per capita available beds between the Organization Economic Cooperation Development (OECD) countries were reported from Canada as 1.73 per 1000 people. The highest per capita available beds were reported from Japan and Germany as 7.95 and 5.33 respectively (7). This suggests that notwithstanding a 14 % increase in the number of available hospital beds following HSEP in MUI's territory, there is still a significant gap between the number of available hospital beds in Isfahan province and in the developed countries. This shortcoming could have a negative effect on access and using inpatient services.

Table 4. The average length of staying (mean ± SD) in hospitals that covered by MUI before and after implementing UHC in 2014

Type of hospitals	*2011	*2012	2013	2014	2015	2016	2017
Public	3.44	3.35	3.73 ± 4.66	3.5 ± 4.09	3.62 ± 4.23	3.6 ± 4.38	3.4 ± 3.8
Social Security Organization	2.22	2.23	2.07 ± 0.12	2.17 ± 0.22	2.35 ± 0.29	2.34 ± 0.24	2.39 ± 0.13
Military's Organizations	2.19	2.31	1.66 ± 1.56	2.48 ± 1.01	2.77 ± 1.3	2.67 ± 1.39	2.26 ± 1.73
Private	1.79	1.7	1.57 ± 0.18	1.56 ± 0.21	1.53 ± 0.19	1.54 ± 0.17	1.68 ± 0.41
Charity	2.13	2.26	1.75 ± 0.52	1.7 ± 0.47	1.62 ± 0.43	1.47 ± 0.39	1.41 ± 0.47
Total	2.48 ± 0.65	2.49 ± 0.59	2.45 ± 0.98	2.48 ± 0.76	2.62 ± 0.81	2.59 ± 0.83	2.44 ± 0.74

\* The standard deviations were not available.

The highest rising in available hospital beds after HSEP was seen in private sector as 83.22 %, however the percentage of private available beds reached to 12.27 % of total MUI's hospital beds after carrying out the HSEP in 2017. Hence in OECD's countries, the three highest relative frequency of available hospital beds in for-profit private sector were in Australia (33 %), Germany (17 %), and in the United States of America (USA) (15%). In these countries, most available hospitals beds belong to public sector predominantly whereas least of them belong to for profit private sector. The USA, is an exemption between OECD's countries, in which the majority (70%) of available hospital beds belonged to non – profit private sector (7). So, in comparison with OECD's countries, the relative frequency of private hospital beds in MUI's territory seems to be in logical approach as developed countries except the USA.

The hospitalization rate (admitted) in MUI's hospitals raised from 115.16 in 2011 to 153.1 per 1000 inhabitants in 2017. The mean discharge rate in hospitals of OECD's countries was as 150.3 in 2013. The lowest discharge rate belonged to Canada (82 per 1000 inhabitants) and the highest discharge rates were belonged to Germany and Norway as 244 and 175 per 1000 inhabitants respectively (7). Considering the intra hospital death in Iranian's hospitals as 29.3 per 1000 hospitalized patients (8), the average discharge rate in hospitals that covered by MUI can be estimated to be about the lowest amount among OECD's countries.

In the same way, the findings of another study conducted in 15 hospitals affiliated to Kermanshah University of Medical Sciences in Iran indicated that the hospitalization rate raised from 79.9 per 10000 inhabitants before HSEP to 99.7 per 10000 inhabitants after HSEP (with mean as 85.2 per 10000 inhabitants) (9).

It would be expected that families especially living in deprived areas, who have previously had unmet health care needs, could have an opportunity to meet

their medical needs through expanding insurance coverage as well as increasing access to medical services and reducing health care costs. Subsequently, it has led to a sudden increase in utilizing health services in the first years of implementing public insurance program due to previous unmet health care needs. It should be noted that such a result has been reported in a research done in the Lorestan province in Iran, in which following first stage of UHC implementation in Iranians' villages and small cities (less than 20000 population) in 2005, in the first years, the hospitalization rate increased from 44.3 to 65.6 per 1000 inhabitants. However, in 2011 onwards, the hospitalization rate decreased for both rural and urban residents, reaching 62.5 and 78.8 per 1000 populations, respectively (10). A similar experience happened in Thailand after expanding UHC in 2001, in which the hospitalization rate for poor people rose from 8% in 2001 to 12% in 2005 (11).

With the purpose of increasing access to health care services and protecting people against health expenditures, in the first step of the Health Transformation Plan in China in 2009, Social Health Insurance was implemented for all the people. Then, in the second step of this plan, public hospitals went through a transformation, getting out of pharmaceutical business (drug sale) and implementing price controls as well as changing hospitals and health care system from treatment – based system. In fact, 60.4 % of Hospitals in China are regarded as to be private hospitals, but only 24.3 % of hospital beds owned by these hospitals. However, hospital admission rate increased about as 2 folds, from 7.41 % in 2010 to 13.52 % in 2016 (12).

Compared to the hospitalization rate following first stage of UHC implementing in Iranians' villages and small cities (less than 20000 population) in 2005, and decreasing franchise fee for insured people, the hospitalization rate was raised maximum as half as that was seen after HSEP in 2014 in intermediate and large cities. Although people living in deprived

areas have more opportunity to get sick and financially protecting them against hospitalization costs, it could result in their willingness to utilize health care services. however, it seems that more inpatient cares on behalf of citizen that stayed in intermediate and large cities would be occurred due to moral hazard and or supplier induced demand phenomenon particularly in this situation that the payment system in Iranians' hospitals run on case- mixed payment predominantly (1,2).

The inpatient bed occupancy rate in MUI's hospitals after HSEP reached to  $69.23 \pm 21.9\%$  While it was 75 % in 2006 (2). Inpatient bed occupancy rate was expected 70 % in the third program of cultural, economic and social development of the country. Also, at the end of this period, it was 57 % in selected hospitals in Tehran (the Capital of Iran) (13). It seems that higher percentage of hospital occupancy rate in MUI's hospitals was near as likely as predicted in national program. Based on the results of present study, hospitals affiliated to SSO has constantly had the highest inpatient bed occupancy rate (68.1 % -74.96 %). It would be paid attention to this point that inpatients services for insured patients covered by SSO have been ever free of charge.

After implementing the HSEP, the ALOS for every admission in MUI's hospitals reached to  $3.7 \pm 2.52$  days in 2016. In contrast, ALOS in hospitals of Isfahan province was about 4 days in 2006 (2). It seems that the ALOS reduced a few after HSEP in MUI's hospitals. Moreover, ALOS in the third program of cultural, economic and social development of the country was expected as 4.2 days, but this index was reported as 6 days for selected hospitals of Tehran in 2002 (13) and 8.54 days in 2012 (14).

Conversely, the ALOS in OECD's countries was 6.9 days. The shortest length of hospital stay was reported in Norway (4.5 days) and the longest length of hospital stay was seen in Japan (17.9 days) (7).

However, the ALOS in MUI's hospitals is less than hospitals in OECD's countries and Tehran's hospitals. It is important to note that before implementing the HSEP, inappropriate hospitalization rate was found 9.5 % in hospitals of 4 provinces of Iran (Tehran, East Azerbaijan, Kerman and Fars), and raised to 16.9% after carrying out the HSEP. In addition, the most inappropriate hospitalization rate was seen in Teheran province's hospitals (15). This is favorable with more ALOS in Teheran's hospitals.

According to the study that was performed in the Massachusetts in the USA, following increasing health insurance coverage as likely as 36% for uninsured citizens, despite of the previous expectation, somehow, they estimated raising in inpatient utilization rate, the opposite results occurred, that way, the ALOS and the number of hospitalized people (admitted by emergency department) reduced as 5.2%. Indeed, hospitalization rate reduced due to better control of preventable diseases (16).

Actually, insured persons were undertaken from health expenses, they were encouraged to benefit from outpatient health services and they represented more adherence to treatment and follow up and tried to prevent from complications and inpatient services (16). Another study in the Massachusetts in 2010 represented that after HSR implementation aiming to increase insurance coverage for all people regardless of their race differences, the readmission in hospitals was reduced in first 30<sup>th</sup> days after discharge from hospitals. It seems that better access to outpatient services following improvement in health insurance coverage, it reduced inpatient cares too (17).

Similar experience with Massachusetts's measurement has taken place in Canada, in which after HSR in primary health care delivery system via implementing those strategies including: improving better access to primary health cares, promoting health status, focusing on team working

approach and multidisciplinary services, insisting on total quality management and continues cares for chronic diseases, thereafter, the preventable visits in emergency wards reduced as 18% (18).

**Limitations:** After implementing the second phase of UHC, the available beds in military organizations reduced 49.6% due to the closure of a hospital. It seems that the effect of UHC on the available beds and the number of hospitalized patients in military' hospitals would be considered cautiously.

In addition, the patients that hospitalized in MUI's hospitals might be coming from neighbor provinces. We have not been able to differentiate hospitalized patients in terms of residency because of limitation in data base. Thus, we supposed that the number of hospitalized patients from others province were constant during the study course, since the UHC launched in the all-Iranian provinces simultaneously.

**Conclusion:** Following UHC, the hospitalization rate increased significantly. Although, the governmental (public) available hospital beds increased, however, the percentage of available hospital beds grew up more in private and charity sectors significantly. The least ALOS was belonged to private and charity hospitals too.

In addition, the BOR in hospitals that covered by MUI was as likely as 70% that was closer to the predefined national's objective in hospitals' efficiency indicator.

**Authors' contributions:**  
 Conceptualization: RK, MS. Data curation: MS. Formal analysis: RK. Methodology: RK, MS. Project administration: RK, MS. Visualization: RK, MS. Writing - original draft: MS. Writing - review & editing: MS, RK.

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