Length of Hospital Stay and its Related Factors in Iran: A Systematic Review and Meta-Analysis

Mohammad Khammarnia [1], Fatemeh Bagherbarahouei [2], *Alireza Ansari-Moghaddam [3]

1. *Department of Health Care Management, Health Promotion Research Center, Zahedan University of Medical Sciences, Zahedan, Iran*
2. *Student Research Committee, School of Health, Zahedan University of Medical Sciences, Zahedan, Iran*
3. *Health Promotion Research Center, Zahedan University of Medical Sciences, Zahedan, Iran*

*Corresponding Author: Email: ansarialireza@yahoo.com

Abstract

Background: One of the effective indicators used to determine the efficiency and optimal use of hospital resources is the length of stay (LOS). Then, we aimed to determine LOS and its related factors in Iran.

Methods: A systematic literature review was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines using the online databases; Medline, EMBASE, Scopus, PubMed, SID, MagIran, and Medlib from 1995 to 2022 using a combination of medical subject. STATA version 11 used for data analysis.

Results: Overall, 75 (cross-sectional, cohort, and case-control) reports were identified. The average length of stay in Iranian hospitals was 6.7 (95% CI: 5.32 -7.74) d. There was a significant relationship between the length of stay in the hospital and different wards of hospital ($P=0.001$). The average of men' LOS was longer than women were [6.9 (95% CI: 5.32 -7.74) vs. 3.9 (95% CI: 1.67-9.41)]. Moreover, the average LOS before and after the Health Transformation Plan (HTP) in Iran has changed, so that it has increased from 5.8 (95% CI: 4.39 - 7.86) to 7.1 (95% CI: 5.59 -9.25) d after HTP ($P=0.30$).

Conclusion: The average length of stay of patients in Iranian hospitals is more than the expected index of the Ministry of Health and Medical Education and is in the unfavorable range (> four days). Moreover, considering the direct effect of the type of departments on LOS; therefore, hospital managers should pay more attention to hospital processes using new process-oriented and customer-oriented management approaches.

Keywords: Length of stay; Length of hospital stay; EMRO region country; Iran

Introduction

Hospitals, as one of the most important community health systems, are also the largest and costliest operational units in health systems. Most of the government's expenditure are paid in the health sector. Additionally, about half of the national cost is spent to health systems in developing countries based on the WHO statistics (1). With rapidly growing trend of health care costs, governments and other major funders of health care services have been investigating for mechanisms to control expenditure and evaluate the efficiency of health care delivery (2).

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Hospitals have severely limited beds to hold inpatients, and most of them are facing substantial financial pressure. Accordingly, it is extremely important to find ways to reduce health care costs (3). In Iran, unequal distribution of resources in many areas has reduced patients' access to hospital beds due to wide dispersion of inhabitants. Hospital per capita in Iran is 1.7 per thousand people (4, 5). Several factors are related to the availability of beds. Length of stay (LOS), readmission rate and inadequate admission are the main factors (6). In fact, reducing the LOS in hospital can lead to the proper use of hospital beds (4).

In other words, LOS is an important and common indicator used to indicate health resource utilization, health care cost and severity of disease (7). It is also used to assess the efficiency of hospital management, patient quality of care, and functional evaluation (8). LOS is defined as the number of days that a patient is hospitalized in a hospital or a similar medical facility (9).

Decreased LOS has been associated with decreased risks of opportunistic infections and side effects of medication as well as improvements in treatment outcome and lower mortality rates. Furthermore, shorter hospital stays reduce the burden of medical expenses and increase bed turnover, which in turn increases hospital profits while reducing overall social costs (10, 11).

The average hospital stay in Barcelona (Spain) was calculated to be 7.1(12). In the United States, the average of LOS was estimated at 6.9 (13). In another study, the average LOS in north of Iran was reported an average of 4.9 d (14). A large number of factors may affect the length of stay (9).

In 2014, with the aim of greater access to health services, the Ministry of Health and Medical Education of Iran (MoHME) launched a series of step-by-step reforms under the title Health Transformation Plan (HTP). HTP includes various interventions aimed at increasing basic health insurance coverage, improving the quality of care and referral system in ministry-affiliated hospitals, and improving hospital indicators (7). To our knowledge, there is no a comprehensive study on hospital length of stay LOS in Iran.

Consequently, this meta-analysis was conducted to systematically review, analyse and synthesis LOS and its influential factors in Iranian hospitals.

Methods

A systematic and meta-analysis study was carried out in 2022. Relevant studies were identified from PubMed, EMBASE, SCOPUS and WEB OF SCIENCES as international databases and MagIran, SID and Medlib as Persian databases from 1995 to 2022. The following search terms were used: ('Length of stay [Mesh] OR '' Hospital length of stay [Mesh] OR Length of hospital stay [Mesh] OR Hospital stay ''AND ('Iran' [Mesh]). Furthermore, the references of identifies papers were scanned and if their title were in line with the topic, they were included.

The searches were done from Sep 2021 to Apr 2022. The eligible observational studies in both English and Persian Language were reviewed. Inclusion criteria were: 1) population-based observational studies reporting the prevalence of Los, 2) cross-sectional, cohort and case-control studies, and 3) relevant studies with clear and detailed data. Correspondingly, case reports, case series, editorials, letters to the editor, commentaries, reviews and clinical trials as well as studies that were not calculating the rate of Los, were excluded. Abstract of all papers were imported into Endnote software version 16, then the duplicates were removed. After that, the authors had read the full text, and if they had the inclusion criteria, those were kept for final review. Moreover, the review and editorial articles were excluded.

In the next stage, we checked the results of the papers. If they had reported the rate of length of stay, they were kept as the final suitable papers for analysis.

Data extraction

Data sheet was created in the Excel software. The extracted data were as follows: title, year of the study, setting, type of hospital, ward and sample size, LOS rate, gender of patients, LOS rate among male and female.

The search produced 373 records, of which 102 papers were duplicated and 165 titles and abstracts were reviewed. The most fundamental reasons for exclusion were studies conducted outside Iran, publication type, and studies not reporting Los' rate. Overall, 75 papers were included in the meta-analysis and data were extracted. Supplementary information can be accessed in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2009 flow diagram (Fig. 1). Moreover, for assessing the risk of bias, we used ROBVIS as a web app designed for visualizing risk-of-bias.

This study was approved by Ethic Committee of Zahedan University of Medical Sciences. (Ethic code: IR.ZAUMS.REC.1400.260).
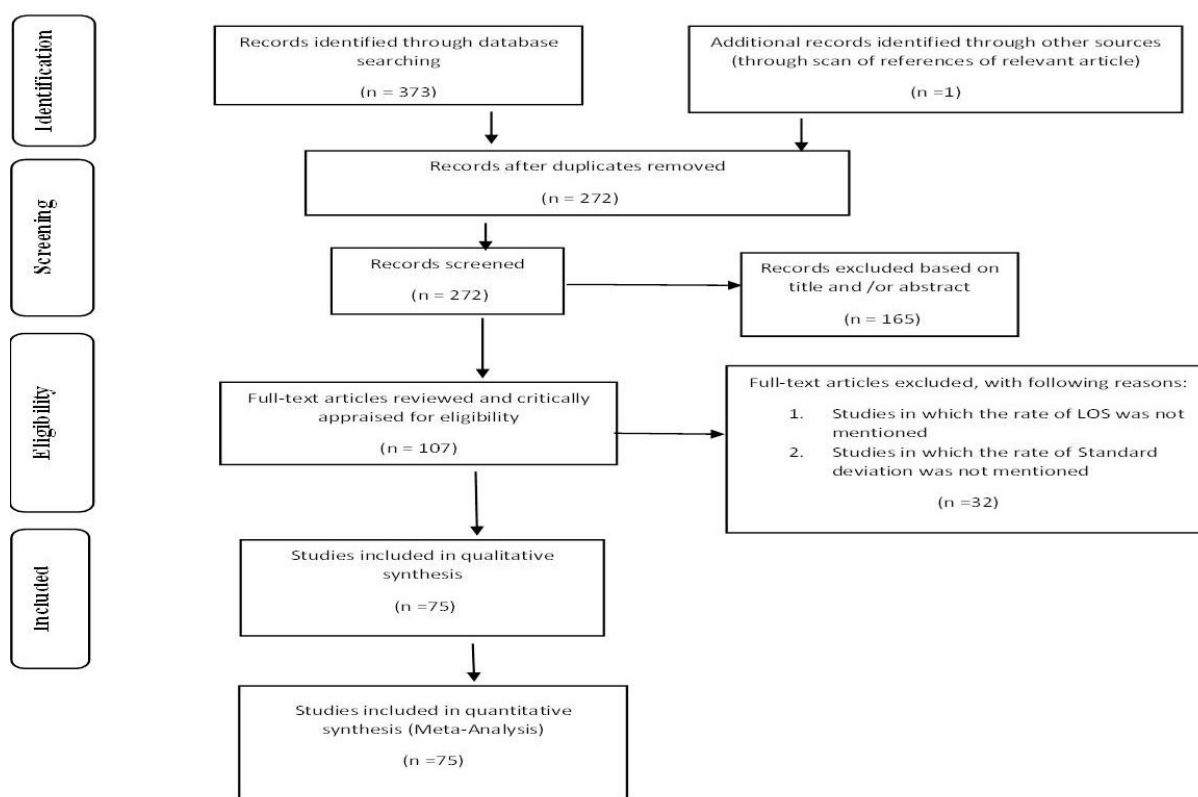

Fig. 1: PRISMA Flow Diagram

Results

Quality assessment of studies

The quality assessment of the studies was appraised by the PRISMA checklist (Fig. 1). Overall, 75 studies entered to meta-analysis phase (Table 1).

As shown in Table 1, the minimum LOS is 1 day and the maximum is 46.3 d related to the length of stay of the elderly in the hospital. About 80% of the studies were performed in general hospitals.

Table 1: Characteristics of primary studies related to the length of hospital stay in Iranian hospitals in the meta-analysis

Study ID	Year	Setting	Type of hospital	Sample size	Hospital Department	LOS rate	LOS rate in men	LOS rate in women
Shaban et al. (15)	2000	Kermanshah	General	60	CCU	12.9		
Rafiei et al.(16)	2002	Arak	General	2244	All dept.	4.1		
Askarian et al. (17)	2003	Shiraz	General	1483	Surgery	6.6		
Tadayon et al. (18)	2003	Zanjan	General	200	Obstetrics	2.1		2.1
Zokaee et al. (19)	2005	Tehran	General	346	ICU	4.0	4.0	
Rajaeefard et al. (20)	2006	Arak	General	2163	Surgery	4.9		
Khorshidi et al. (21)	2006	Hamedan	General	100	Internal	1.0		
Rajaeefard et al. (20)	2006	Arak	General	2163	Internal	4.2		
Teimury et al. (22)	2006	Khoramabad	General	201	CCU	16.1	13.9	18.4
Rafiei et al. (23)	2006	Shiraz	General	3564	All dept.	8.4		
Tavalaei et al. (24)	2007	Tehran	General	830	Psychiatric	10.8		
Rafiei et al. (25)	2007	Arak	Specialty	1600	Obstetrics	1.5		1.54
Rezamand et al. (26)	2007	Ahvaz	General	140	Internal	7.6		
Rafiei et al. (27)	2007	Arak	General	874	ICU	9.2		
Mardani et al. (28)	2008	Khorramabad	General	100	Internal	3.2		
Karami et al. (29)	2009	Ahvaz	General	60	Obstetrics	8.4		
Hajinasrollah et al. (30)	2010	Tehran	General	75	Internal	3.2		
Arab et al. (31)	2010	Khorramabad	General	662	All dept.	4.3	4.7	2.3
Ravangard et al. (32)	2011	Tehran	Specialty	3421	Surgery-	2.2		
Ravangard et al. (32)	2011	Tehran	Specialty	3421	Obstetrics	2.0		
Izadi-Mood et al. (33)	2011	Isfahan	General	2325	Poisoning	1.0		
Izadi-Mood et al. (34)	2011	Isfahan	General	184	Poisoning	1.0		
Ravangard et al. (32)	2011	Tehran	Specialty	3421	Internal	2.1		
Zeyghami et al. (35)	2011	Karaj	General	263	CCU	11.5		
Haghgoshaei et al. (36)	2011	Tabriz	General	885	All dept.	1.6		
Zolfaghari et al. (37)	2012	Tehran	General	90	Surgery	6.3		
Bahrami et al. (38)	2012	Qazvin	Specialty	240	ICU	15.5		
Asgharzadeh et al. (39)	2012	Karaj	Specialty	263	CCU	11.5		
Abdi et al. (40)	2012	Karaj	General	132	All dept.	6.8		
Rezvan et al. (41)	2013	Tehran	Specialty	20	Psychiatric	13.0		
Behnam Voshani et al. (42)	2013	Mashhad	General	40	NICU	20.9		
Mahmoudi et al. (43)	2013	Zahedan	General	40	NICU	16.5		
Alizade taheri et al.(44)	2013	Tehran	General	44	NICU	24.5		
Boushehri et al. (45)	2013	Tehran	General	54	Internal	8.3		
Moosazadeh et al. (46)	2013	Kerman	General	390	All dept.	4.9		
Haghparast et al. (47)	2013	Tehran	General	8356	All dept.	6.8		
Akbarzadeh et al. (48)	2014	Hamedan	Specialty	11246	Obstetrics	1.4		1.7
Valizadeh et al. (49)	2014	Tabriz	General	72	NICU	37.3		

Jafari et al. (50)	2014	Mashhad	General	50	NICU	7.9		
Pourreza et al. (51)	2014	Ahvaz	Specialty	1000	Internal	9.4		
Bijani et al. (52)	2014	Qazvin	Specialty	368	ICU	11.5		
Hashemi-Fard et al.(53)	2014	Sabzevar	General	179	ICU	5.1		
Mousavi et al. (54)	2014	Tehran	General	55	ICU	8.3		
vahidi et al. (55)	2014	Tabriz	Specialty	349	CCU	15.5		
Iranmanesh et al. (56)	2015	Tehran	General	92	NICU	14.6		
Shahriari et al. (57)	2015	Isfahan	General	50	ICU	3.2		
Karim et al. (58)	2015	Mashhad	General	188068	All dept.	6.5		
Karim et al. (59)	2015	Mashhad	General	449678	All dept.	6.0		
Kermani et al. (60)	2015	Tehran	General	204	All dept.	6.1	6.2	5.9
Khatami et al (61)	2015	Tehran	General	246	ICU	8.6		
Farokhi et al (62)	2015	Tehran	General	100	NICU	16.8		
Babamohamadi et al. (63)	2016	Isfahan	General	50	Surgery	8.5		
Torabipour et al. (64)	2016	Tehran	General	649	Surgery	8.3		
Sari et al. (65)	2016	Tehran	General	415	Internal	10.5	10.7	10.01
Yazdannik et al. (66)	2016	Isfahan	General	64	ICU	5.3		
Torabipour et al. (64)	2016	Tehran	General	649	ICU	2.2		
Arefnezhad et al. (67)	2016	Zabol	General	349	CCU	13.4		
Vejdani et al. (68)	2016	Sabzevar	General	3330	All dept.	4.3		
Jeddian et al. (69)	2017	Tehran	General	1815	Surgery	6.3		
Jeddian et al. (69)	2017	Tehran	General	1815	Internal	9.4		
Ghorbani et al. (70)	2017	Shiraz	General	839	ICU	10.9		
Roham et al. (71)	2017	Tehran	General	1159	Burn	37.9		
Pourrahimi et al. (72)	2017	Tehran	Specialty	400	All dept.	46.3		
Boskabadi et al. (73)	2018	Mashhad	General	1347	Obstetrics	1.5		1.5
Moradi et al. (74)	2018	Kerman-shah	General	60	NICU	14.7		
Farahani et al. (75)	2018	Tehran	General	78	NICU	18.3		
Alaee et al. (76)	2018	Tehran	General	100	NICU	8.5		
Baniasadi et al. (77)	2019	Bandar Ab-bas	Specialty	500	Surgery-Obstetrics	1.9		1.9
Baniasadi et al. (78)	2019	Bandar Ab-bas	Specialty	350	All dept.	3.0		
Sadeghipour et al. (79)	2019	Shiraz	General	225	All dept.	1.6		
Noohi et al. (80)	2020	Tehran	General	3203	Psychiatric	11.5		
Zamane et al. (14)	2020	Sari	General	1256	All dept.	4.9	4.8	5.0
Zarrizi et al. (81)	2021	Rasht	Specialty	1202	ICU	2.3		
Setareh et al. (82)	2021	Kashan	General	150	ICU	11.2		
Orooji et al. (83)	2021	Mashhad	General	7130	All dept.	8.1		

The longest stay was observed in the ICU, CCU and NICU wards and the lowest was in the obstetrics and poisoning wards. the average length of hospital stay in single patients was 7.8 and 3.8, respectively, and in married patients were 5.6 and 5, respectively.
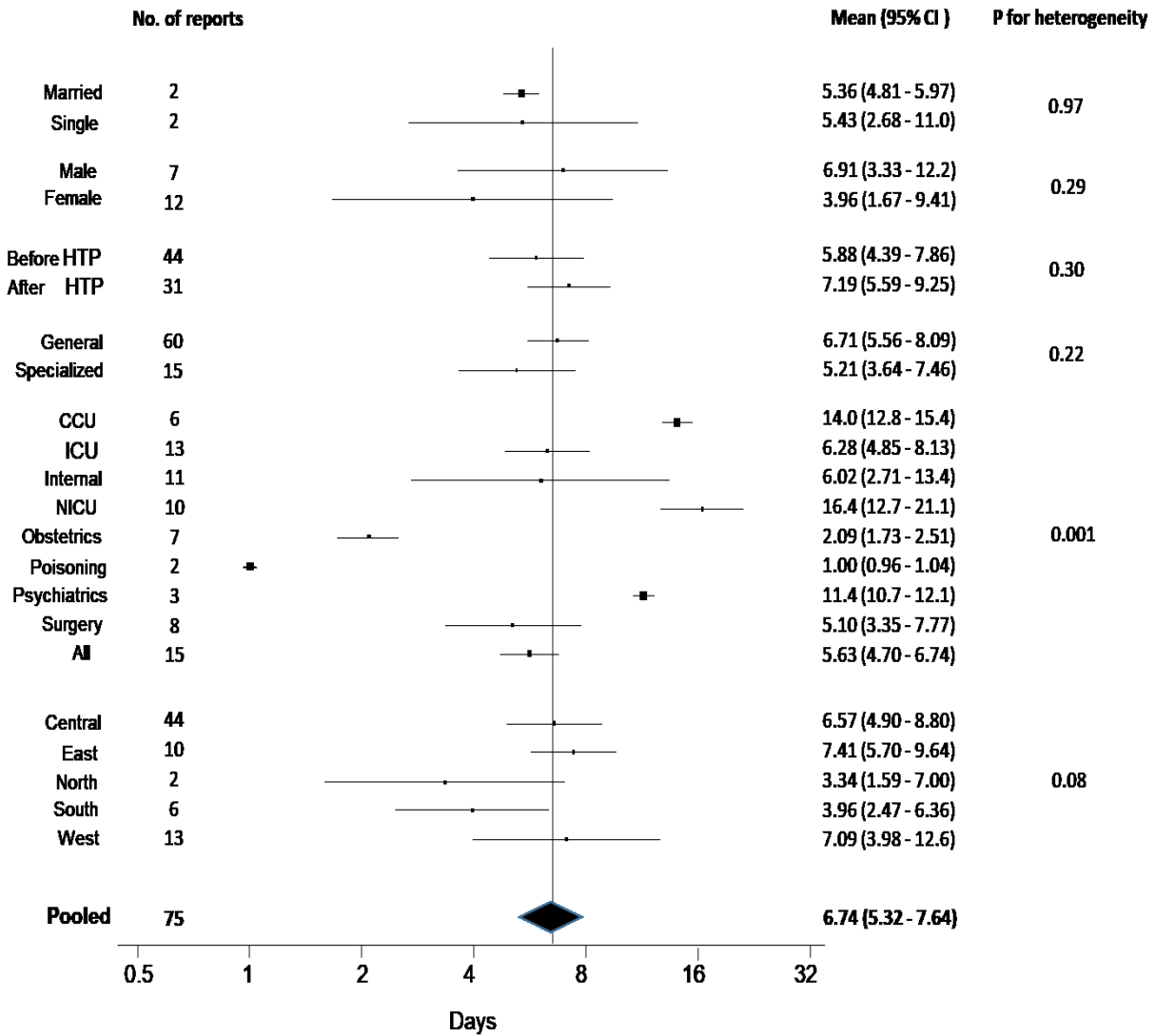
No. of reports		Mean (95% CI)	P for heterogeneity
Married	2	5.36 (4.81 - 5.97)	0.97
Single	2	5.43 (2.68 - 11.0)	
Male	7	6.91 (3.33 - 12.2)	0.29
Female	12	3.96 (1.67 - 9.41)	
Before HTP	44	5.88 (4.39 - 7.86)	0.30
After HTP	31	7.19 (5.59 - 9.25)	
General	60	6.71 (5.56 - 8.09)	0.22
Specialized	15	5.21 (3.64 - 7.46)	
CCU	6	14.0 (12.8 - 15.4)	
ICU	13	6.28 (4.85 - 8.13)	
Internal	11	6.02 (2.71 - 13.4)	
NICU	10	16.4 (12.7 - 21.1)	
Obstetrics	7	2.09 (1.73 - 2.51)	0.001
Poisoning	2	1.00 (0.96 - 1.04)	
Psychiatrics	3	11.4 (10.7 - 12.1)	
Surgery	8	5.10 (3.35 - 7.77)	
All	15	5.63 (4.70 - 6.74)	
Central	44	6.57 (4.90 - 8.80)	
East	10	7.41 (5.70 - 9.64)	
North	2	3.34 (1.59 - 7.00)	0.08
South	6	3.96 (2.47 - 6.36)	
West	13	7.09 (3.98 - 12.6)	
Pooled	75	6.74 (5.32 - 7.64)	

Fig. 2: The Forest plot of hospital stay in Iran

According to Fig. 2, 75 articles have been reviewed. There is no significant relationship between marital status, gender, HTP, type of hospital and geographical regions of Iran with LOS. A significant relationship was found between different hospital wards and LOS. In general, the patients' average length of stay in Iranian hospitals was 6.74 (95% CI: 5.32 -7.74).

Discussion

LOS is an important indicator used in hospitals assessment extensively. This indicator presents hospital performance and its efficiency level. Therefore, it is an essential indicator to analyse hospital performance (84).

According to the results of the present meta-analysis, the average LOS in Iranian hospitals was 6.7, which is the most important data obtained from this study. This average is higher than the standard declared by the MoHME (more than four days) (Fig. 2). The average length of stay in seven hospitals in Ontario-Canada was 4.6 d (85), and it is less than the average length of stay in Iran. LOS of the elderly in the Netherlands was estimated at 7 d. This is a reasonable amount considering the long stay of the elderly (84).

The high average LOS occupies hospital beds and reduces bed turnover interval. In this regard, longer residence time was considered a sign of inefficiency in resource usage (51). Several factors lead to increased length of hospital stay. Problems in hospital such as the patient discharge process, patient a physician at the patient's bedside, the patient's age and the presence of underlying diseases are factors that have led to an increase in the length of stay in hospitals (9, 60, 79). Due to the shortage of beds in Iran and the low per capita number of beds in this country (less than 2 per 1000 persons); therefore, the rational use of hospital beds increases people's access to hospital services (4, 5).

According to the results, LOS was significantly different in hospital wards (32, 59). Based on the findings of Table 1, most of LOS was in the elderly patients, so it can be concluded that the elderly patients spend longer in the hospital due to old age, underlying diseases and physical weakness. This finding is consistent with other studies (31, 67). In order to better allocate resources, hospital beds, and optimal productivity of existing beds, measures to reduce the presence of elderly patients in the hospital through the development of home care and nursing homes were suggested (86).

Intensive care units (ICU, CCU, NICU) also have a longer average length of stay than other wards (44). This is due to the critical condition of patients, especially premature infants, and the need for more care (55). The average length of stay in psychiatric patients was 11 days, which is a significant amount due to the longer stay of these patients in the hospital. This finding is consistent with a study conducted in the United States (86).

The average LOS in geographical areas of Iran is different and close to significant (79). In this regard, LOS in the East and West was longer than the north and south of Iran (Fig. 2). In fact, the deprivation of the western and eastern provinces, the lack of specialist physicians and hospitals equipped with delays in diagnosing diseases are among the factors that have led to an increase in the length of stay in these areas.

The average length of stay among men was longer than women, which is consistent with other studies (31, 83). Men are more at risk of death than women due to accidents, injuries, etc.

The patients' length of stay had increased after the HTP, which is due to the increase in the number of patients referred to hospitals. This finding is consistent with other studies (87,88).

Among the limitations of this study, we can mention to a small number of studies that have examined the average length of stay in married and single patients. Many studies had investigated few variables and this caused the analysis and evaluation of variables to be done with limitations.

Conclusion

The average stay of patients in the hospital is more than the standard mentioned by the MoHME (more than 4 d). Considering that the type of inpatient department has a direct effect on LOS, it is suggested that hospital managers and policy makers should pay more attention to hospital processes using new process-oriented and customer-oriented management approaches and concepts, such as quality management systems and re-engineering of processes and modification of its influential variables to reduce the length of patients' stay in hospital.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

Acknowledgements

Conflict of interest

The authors declare that there is no conflict of interest.

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