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

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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).
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

<table>
<thead>
<tr>
<th>Study ID</th>
<th>Year</th>
<th>Setting</th>
<th>Type of hospital</th>
<th>Sample size</th>
<th>Hospital Department</th>
<th>LOS rate in men</th>
<th>LOS rate in women</th>
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<td>Shaban et al. (15)</td>
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Available at:  [http://ijph.tums.ac.ir](http://ijph.tums.ac.ir)
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.
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.

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Conflict of interest

The authors declare that there is no conflict of interest.

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