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# Hospital deductions, types, and causes: A systematic review



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## ABSTRACT

**Objective:** The current study aims to provide valid information about the causes and types of hospital deduction records via a systematic review.

**Method:** This systematic review was performed by searching the databases including PubMed, Scopus, Science Direct, Ovid, Medline, Cochrane, ProQuest, and IranMedex, Magiran, Sid, and Medlib databases for studies without time limitation. Updates were added to the searches during the study. Search strategies included the combination of keywords including "Billing error" OR "Deductive" OR "Error payment" OR "Insurance claim" OR "Medical claim" OR "Improper payment" OR "Insurance reimbursement" OR "Medical payment" OR "payment error" with "Hospital" and "medical records". The reference lists of each article were manually searched to find additional relevant articles. All records without time limitation, those written in Persian and English, and the ones investigating the types and causes of deductions in hospital inpatient bills records were included.

To determine the eligible records, two authors extracted the data independently; and discrepancies were resolved through discussion or, if required, through consultation with a third author. The quality of the articles was analyzed using STROBE checklist.

**Results:** The search strategy yielded 1,264 records from electronic databases, and 15 records were identified by the manual search. After removing the duplicates and screening the database by titles and abstracts, 39 of these records remained. The full text of these 39 records was checked and, finally, 22 of them met inclusion criteria. The major causes of deductions in the documentation included human errors, incomplete document registration, documentation errors, added prices, added request, and calculation errors.

**Conclusions:** Education and cooperation of staff and collaboration of all stakeholders such as hospitals, insurance organizations, and related staff in this field are necessary for conducting a substantial action to reduce hospital deduction.

**Keywords:** Deduction, Hospital, Systematic review, Insurance

**Cite this Article:** Mousarrezai, M.T., Doshmangir, L., Jannati, A., Imani, A. 2019. Hospital deductions, types, and causes: A systematic review. *Bali Medical Journal* 8(2): 302-310. DOI:10.15562/bmj.v8i2.551

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Received: 2017-03-17

Accepted: 2017-07-24

Published: 2019-08-01

## INTRODUCTION

Comparing the health care system in Iran with those of some developed countries shows the different role of public and private sectors in servicing and paying methods, which are related to hospital deductions. In Iran, primary health services (PHCs) are provided by the government, while hospital care (second and third level services) is provided by both private and public sector; however, the public sector has a bigger share. The hospital care (the second and third levels) costs in some of developed countries and Iran are mostly reimbursed through governmental budgets.<sup>1</sup>

Hospital as a center of healthcare services is considered a determinant of the success of health system and equitable expansion of healthcare. So, survey how to use facilities and available resources in this part and their efficiency has significant importance.<sup>2</sup> A large share of hospitals' incomes is provided through contracts with insurance organizations and services provided to insured individuals.<sup>3</sup> These organizations subtract some money per month from all requested funds after auditing the received financial documents of hospitals, a

process known as insurance deductions.<sup>4</sup> This process is applied when requested services do not comply with provided services, requested fees are not in accordance with determined tariffs, and/or required services are not based on commitment services.<sup>5</sup>

The deduction is one of the controversial issues between insurance organizations and healthcare providers despite insurance rules and regulations. Consequently, insurance organizations impose heavy financial costs on healthcare providers during service delivery and in collecting and payment periods.<sup>6</sup> The unawareness of healthcare institutions and insurance rules of deductions ultimately causes dissatisfaction in insured peoples, because, in some cases, this deduction imposes additional expenses to the patient and insured people. The added fees of medicine are one of these cases.<sup>7</sup> Moreover, hospital deduction through wasting of resources and incomes cause a decrease in the hospital's financial capacities.<sup>8</sup>

By precisely identifying the reasons of hospital deductions, a higher efficiency of hospitals can be

planned, which can be effective in improving the quality of healthcare services and preventing the waste of financial resources.<sup>9</sup> In previous studies, reasons and various types of deductions (insurance documents in patient files and surgeons' wage<sup>10</sup> and causes such as added request and human resource errors<sup>11</sup>) were mentioned. However, to the best of our knowledge, there is no systematic review about hospital deductions. This study was conducted to provide valid information about reasons and types of deductions in hospital records via a systematic review.

## MATERIAL AND METHODS

In this systematic review, we searched the databases of the Cochrane Library, Medline, Scopus, Science Direct, and Proquest in January 2015. The researchers utilized Google Scholar general search engine, and more specifically Scopus, Science Direct, Ovid, Medline, Cochrane, ProQuest, and PubMed. The search was performed using the following keywords as well as their Persian equivalents: "Deduction", "Hospital", and "Insurance". Medical Subject Headings (MESH) terminology was used in PubMed. The Boolean logic was applied to combine the keyword deduction and its variants with the following search terms. Search strategies included the combination of three sets of keywords ("Billing error" OR "Deductive" OR "Error payment" OR "Insurance claim" OR "Medical claim" OR "Improper payment" OR "Insurance reimbursement" OR "Medical payment" OR "payment error") with "Hospital" and "medical records". All records without time limitation, those written in Persian and English and investigating about types and causes of deductions in hospital inpatient bills records were included and papers only referring

to the outpatient bill deductions of hospitals were excluded. The reference lists of each article were manually searched to find additional relevant articles. The retrieved articles were screened based on titles and abstracts and STROBE checklist was applied for evaluating the articles. STROBE is a checklist (Table 1) adopted from the Institute of Social and Preventive Medicine (ISPM), the University of Bern as a research tool for cross-sectional studies (<http://www.strobe-statement.org>). This checklist includes 22 items, but 5 items were ignored since they were not applicable for our study. We categorized the quality of included study in three levels including low, moderate, and high.

When the studies included an item, they were assigned the score 1; if that item did not exist in the study or insufficient data were offered, it was assigned the score 0. Finally, the sum of scores for the items was calculated: the studies with 70% of criteria (scored 12-17) acquired a high quality, those with 50-70 % of criteria (scored 8-11) had an average quality, and those having less than 50% of criteria (scored below 8) had a poor quality (Table 2).

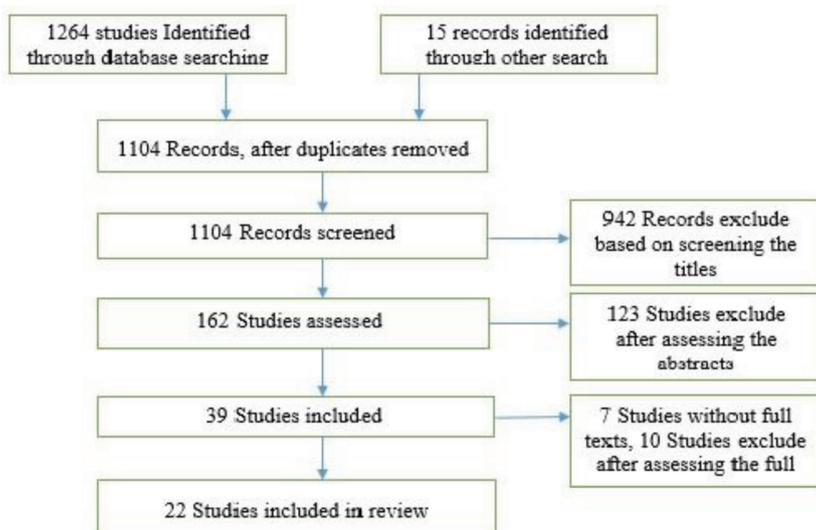
All the retrieved English and Persian records were included in our study and then were imported in the summarized tables. The items extracted from the articles included study authors, year and type, and cause of deductions. Considering the qualitative nature of articles, we used content analysis to analyze the collected data.

## RESULTS

The search strategy yielded 1264 records from electronic databases, and 15 records were identified by the manual search. After removing the duplicates and screening the articles by titles and abstracts, 39 of these records remained. The full text of these 39 records was checked and, finally, 22 of them met inclusion criteria (Figure 1)

Checking 22 records resulted in 17 original research articles that were conducted in Iranian hospitals (Table 3), and 1 review article and 4 records related to deduction reports of the Office of Inspector General (OIG) in the United States of America.

In this research, 5 studies (28% of them) were assessed as having a high quality, 9 studies (50%) had an average quality, and 4 studies (22%) had a low quality. The major causes of deductions in the documentation included incomplete document registration, documentation errors, added prices, added request, and calculation errors. In addition, the most frequent types of deductions in the retrieved local (Persian) studies were related to surgeon wage, anesthesia, doctor visit,



**Figure 1** Flowchart of study selection diagram

**Table 1 STROBE**

1	(a) The study design is indicated with a commonly used term in the title or the abstract.
	(b) An informative and balanced summary of what was done and what was found is provided in the abstract.
2	The scientific background and rationale for the investigation being reported are explained.
3	Specific objectives, including any pre-specified hypotheses, are stated.
4	Key elements of study design are presented early in the paper.
5	The setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection are described.
6	The eligibility criteria and the sources and methods of selection of participants are given.
7	All outcomes, exposures, predictors, potential confounders, and effect modifiers are clearly defined. Diagnostic criteria are given, if applicable [Not Applicable].
8	For each variable of interest, sources of data and details of methods of assessment (measurement) are given. The comparability of assessment methods are described if there is more than one group [Not Applicable]
9	Any efforts to address potential sources of bias are described.
10	It explains how the study size was arrived at.
11	It explains how quantitative variables were handled in the analyses. If applicable, it describes which groupings were chosen and why [Not Applicable].
12	(a) All statistical methods, including those used to control for confounding, are described.
	(b) Any methods used to examine subgroups and interactions are described.
	(c) It explains how missing data were addressed.
	(d) If applicable, the analytical methods are explained, taking account the sampling strategy.
	(e) Any sensitivity analyses are described.
13	(a) Numbers of individuals at each stage of the study (e.g., numbers of the potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analyzed) are reported.
	(b) Reasons for non-participation at each stage are given.
	(c) The use of a flow diagram is considered.
14	(a) The characteristics of study participants (e.g., demographic, clinical, and social) and information on exposures and potential confounders are given.
	(b) The number of participants with missing data for each variable of interest is indicated.
15	The numbers of outcome events or summary measures are reported.
16	(a) Unadjusted estimates are given and, if applicable, confounder-adjusted estimates and their precision (e.g., 95% confidence interval). It makes clear which confounders were adjusted for and why they were included.
	(b) Category boundaries are reported when continuous variables were categorized.
	(c) If relevant, it considers translating estimates of relative risk into absolute risk for a meaningful time period [Not Applicable].
17	Other analyses were done; e.g., analyses of subgroups and interactions, and sensitivity analyses are reported [Not Applicable].
18	Key results are summarized with reference to study objectives.
19	The limitations of the study are discussed, taking into account sources of potential bias, or imprecision. Both the direction and magnitude of any potential bias are discussed.
20	A cautious overall interpretation of results is given, considering objectives, limitations, a multiplicity of analyses, results from similar studies, and other relevant evidence.
21	The generalizability (external validity) of the study results is discussed.
22	The source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based are given.

Source: <http://www.strobe-statement.org>

**Table 2** Quality assessment of retrieved studies on deductions

Item no	Study																		
	Rohollah Askari <sup>10</sup>	Ali Jannati <sup>12</sup>	Javad Zarei <sup>13</sup>	Reza Safdari <sup>14</sup>	Ali Mohammadi <sup>7</sup>	Farid Khorami <sup>15</sup>	Somaye Moalemi <sup>16</sup>	Saied Karimi <sup>11</sup>	Nahid Tavakoli <sup>17</sup>	Mahtab Karami <sup>18</sup>	Nahid Tavakoli <sup>19</sup>	Maryam Yaghobi <sup>20</sup>	Krushat W. Mark <sup>21</sup>	Nahid Nasirrad <sup>22</sup>	Mohamad R Rahimi <sup>23</sup>	Masoud Yavari <sup>24</sup>	Hasan Bagheri <sup>25</sup>	Effat N Sarvestani <sup>26</sup>	
1	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
2	+	+	+	+	-	-	-	+	+	-	+	+	-	+	+	+	+	+	
3	+	+	+	+	-	-	-	+	+	+	+	-	+	-	+	-	-	-	
4	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	+	+	
5	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	
6	+	+	-	-	+	+	-	+	+	-	+	+	+	+	-	-	-	+	
7	NA																		
8	NA																		
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10	+	+	-	-	-	-	+	+	+	+	+	+	+	+	+	+	-	+	
11	NA																		
12	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	
13	+	+	-	-	-	-	-	+	+	+	+	+	+	+	-	-	-	-	
14	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	
15	+	-	+	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
16	NA																		
17	NA																		
18	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	
19	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	
20	+	+	+	+	+	+	+	+	+	-	+	+	-	-	+	+	+	+	
21	-	-	+	-	-	-	-	-	-	-	+	-	+	+	-	+	+	+	
22	+	+	+	+	-	+	-	+	+	+	+	-	-	-	-	-	+	-	
Score	12	12	10	8	7	8	7	12	12	9	15	10	11	11	7	7	9	10	
Percent	71%	71%	59%	47%	41%	47%	41%	71%	71%	53%	88%	59%	65%	65%	41%	41%	53%	59%	

NA= Not Applicable

**Table 3** The main types and causes of hospital deductions in retrieved studies

Authors	Place of study	Pub. year	Study type	Type of deductions (errors)	Cause of deductions
Ali Mohammadi et al. <sup>7</sup>	Iran (Khorram Abad)	2013	Cross-sectional descriptive	The cost of anesthesia, hoteling cost, the cost of doctor visits and consulting, and global admission fee tariff	Incomplete registration document and errors in the documentation
Ruhollah Askari et al. <sup>10</sup>	Iran (Yazd)	2011	Cross-sectional descriptive	Surgeon wage, doctor visits, and medical deductions	False documentation and added prices
Saied Karimi et al. <sup>11</sup>	Iran (Esfahan)	2011	Cross-sectional descriptive	Paraclinical costs, length of stay, operating room, wage, etc.	Excess demand, miscalculation, and added prices
Ali Jannati et al. <sup>12</sup>	Iran (Tabriz)	2013	Cross-sectional descriptive	Operating room supplies, length of stay, and surgeon wage	Added price, added request, and Scientific Council deductions

Table 3 Continue

Authors	Place of study	Pub. year	Study type	Type of deductions (errors)	Cause of deductions
Javad Zarei et al. <sup>13</sup>	Iran (Ahvaz)	2014	Cross-sectional descriptive	Doctor visits, anesthesia, medicine, operating room, encoding surgical procedures, the cost of anesthesia, the cost of medicine and its commitment, doctor visits' tariff, the global tariff costs (such as the cost of anesthesia, medicine, and operating room supplies), and hoteling	Incomplete registration document, errors in the documentation, added request, miscalculation, and separate repeated request for global cases
Reza Safdari et al. <sup>14</sup>	Iran (Tehran)	2014	Cross-sectional descriptive	Doctor visits, anesthesia, medicine, operating room, encoding surgical procedures, the cost of anesthesia, the cost of medicine and its commitment, doctor visits' tariff, the global tariff costs (such as the cost of anesthesia, medicine, and operating room supplies), and hoteling	Incomplete registration document, errors in the documentation, added request, miscalculation, and separate repeated request for global cases
Farid Khorami et al. <sup>15</sup>	Iran (Bandar Abbas)	2014	Cross-sectional descriptive	Wage, medicines, geographical full time, anesthesia, operating room, preferences, visit, residence, test, and counseling	Incomplete registration document and errors in the documentation
Somaye Moalemi et al. <sup>16</sup>	Iran (Kerman)	2011	Cross-sectional descriptive	Surgeon wage, average length of stay, nursing services, visit and physicians' consulting, operating room, anesthesia, laboratory, physiotherapy, medical supplies, CT scans, and X-rays	Excess demand, miscalculation, added prices and errors in documentation
Nahid Tavakoli et al. <sup>17</sup>	Iran (Esfahan)	2008	Cross-sectional descriptive	Medicines and other laboratory services, anesthesia, counseling, length of stay, visit, equipment, operation, and tests	Incomplete registration document
Mahtab Karami et al. <sup>18</sup>	Iran (Kashan)	2010	Cross-sectional descriptive	Medication, counseling, description of the operation, laboratory, radiology, and anesthesia	Excess demand, added prices, and errors in documentation
Nahid Tavakoli et al. <sup>19</sup>	Iran (Esfahan)	2015	Cross-sectional descriptive	Laboratory, radiology, medicine, doctor visit, surgical wage, operating room, inpatient beds, anesthesia, and counseling	Incomplete registration documentation, errors in documentation, and excess demand
Maryam Yaghobi et al. <sup>20</sup>	Iran (Esfahan)	2011	Cross-sectional descriptive	Length of stay, visit, wage, operating room, anesthesia, anesthetic medicine, tests, medicines and supplies, radiology, global admission fee subject to tariffs, equipment, and miscellaneous*	Errors in documentation and miscalculation (total difference **)
Krushat, W. Mark & Bhatia, Anita J <sup>21</sup>	USA	2005	Analytical report	Medically unnecessary services, DRG coding errors, lack of documentation, and length of stay concerns	-----
Nahid Nasirirad et al. <sup>22</sup>	Iran (Tehran)	2010	Qualitative study	Defects in the complete file by nurse and physician and incomplete documentation	Educational hospital, Public hospital, Therapeutic department personnel neglect, Secretaries department personnel neglect, Staff ignorance to work process correction, Income unit employee's carelessness, serious less and lack of information. Inattention of managers to reduce deduction, lack of experience, and being a student in this field

Table 3 Continue

Authors	Place of study	Pub. year	Study type	Type of deductions (errors)	Cause of deductions
Mohamad Reza Rahimi & Fadaei M <sup>23</sup>	Iran (Ardebil)	2014	Descriptive (field study)	Medicine, laboratory, consult, radiology, operation sheet, and anesthesia	Excess demand and added prices of medicine, non-existence of physician order, nonattachment of the test order sheet, non-existence of test results, physician order and consult order sheet, absence of anesthesiologist and surgeon's signature and stamp, lack of patient ID in anesthesia sheet and operation sheet, and incomplete operation report sheet
Masood Yavari et al. <sup>24</sup>	Iran (Tehran)	2015	Cross-sectional descriptive	Lack of documentation or inaccurate documentation of healthcare services	High workload of discharge department staff, high ratio of clinical records to the staff, lack of appropriate relevant educational background in personnel of the financial department, and lack of written task description
Hasan Bagheri & Amiri M <sup>25</sup>	Iran (Shahrood)	2011	Cross-sectional descriptive	Laboratory, Medicine, Surgery, and Anesthesia	Mismatching test sheets with order, not listed medicine prescriptions items, duplicated and added price of medicines, lack of physician order, lack of an approved stamp and signature of the technical assistant on insurance test sheet, incorrect encoding, not listed on patient ID in anesthesia sheet, not acceptance of reported patient length of stay and nursing services by insurances, excess demand, medical commission deductions, and miscalculation of insurance bills out of commitment services
Effat N Sarvestani et al. <sup>26</sup>	Iran (Kerman)	2015	Cross-sectional descriptive	Visit, consultation, laboratory, radiology, accounting, and encoding	Patient history defect for inpatients records, lack of an approved stamp and signature of the physician, non-existence patient's ID, incorrect encoding; nonattachment of visit, consult, radiology and presentation sheet, miscalculation, not stated visit date, non-existence of test results.

\* Miscellaneous deductions is the deduction due to the expired insurance card or other costs of service that is not mentioned in the above classification. For example, costs of laboratory services are included in this category.

\*\* The difference in total is an amount of false deductions that occur due to mistakes in calculation and total deductions, and indeed these deductions have no adverse effect on the hospital.

medicines and supplies, and paraclinical costs (test and radiology). According to the OIG report, the most prevalent types of Medicare bill errors are the lack of medical necessity, followed by insufficient documentation, incorrect coding,<sup>21</sup> documents not provided because of other investigations,<sup>27,28</sup>

Deficiency in documentation,<sup>29</sup> Medicaid or State children's health insurance program services that are not eligible for programs or persons, and documenting the members' diagnoses.<sup>30</sup>

The main types and causes of hospital deductions are shown in Table 3.

## DISCUSSION

Hospital deductions are one of the most important financial problems in Iranian health system, and expense management is the main concern for

hospital managers. In this study, we aimed to determine the causes and types of hospital deductions; since it is of paramount importance to give valid

information for hospital managers to pay attention to controlling hospital expenses and deductions.

Based on our results, the major causes of deductions are related to human errors. The causes including incomplete document registration, errors in documentation, added request, and miscalculation and addition of prices and the most frequent types of deductions were related to surgeon wage, anesthesia, physician visit, medicine and operating room supplies, and paraclinical costs. In United States Medicare reports, the most frequent types of deductions are due to the inadequacy and deficiencies of documentation, miscoding, and medically unnecessary services, services that are not eligible for programs, length of stay concerns, diagnostic related group coding errors, and lack of investigations. It is notable that these causes are originated from the human errors. Based on a study by Yavari et al., only a minority of the staff of the finance sector (including the income and discharge units) had an education background in accounting.<sup>24</sup> Being an educational hospital, using students in the documentation process, lack of responsibility and the low experience of the training medical staff with an accurate and systematic recording of the care process can play a key role in the creation of these deductions.<sup>31</sup> In another survey by Omrani et al., it was revealed that the majority of financial sector staff had not attended any training course related to the documentation of health care services and discharge process.<sup>24</sup> In addition, most of the clerks and staff working in discharge unit did not have related educational background nor did they attend relevant course; in some cases, they even had no written task description.<sup>32</sup> A large number of the clinical records processed by an individual operator (an average of 20 records per day) are another factor for the poor and incomplete documentation in the healthcare services.<sup>24</sup>

Various types of deductions were mentioned in the literature such as “surgery wage” derived from errors in encoding surgical procedures, disapproval of the operation sheet by the surgeon, lack of details of the surgery, and not registering the name, hospitalization, and surgery dates,<sup>14</sup> and “deductions due to anesthesia services” derived from not having the anesthesia sheet copied, absence of anesthesiologist's signature, unavailability of patient's ID, the anesthesiologist's absence, and carrying out the procedure by technicians.<sup>18</sup> In “physician visits”, these deductions are due to sending invalid or distorted dates of prescriptions, sending the patient or pharmacy sheet instead of physician sheet, prescriptions unsigned or without the stamp of Iranian Medical Council number. In deductions related to “medicines and consumer goods”, these errors were derived from nonattachment of medicine and equipment

invoices, lack of an approved stamp and signature of the pharmacist in charge, lack of registration of time and medicine expiration date by the nurse, and distorted name, date, and type of medicine.<sup>10</sup> Finally, in the case of “paraclinical services such as tests and radiology”, these deductions are derived from the non-existence of test results, lack of physician order, lack of the stamp and signature of the radiologist in charge, and nonattachment of the test order sheet.<sup>18</sup>

“Additional fees” are another cause of deductions found in the present research, originated from nonconformity of a requested tariff with insurance commitment tariff.<sup>11</sup> In some studies, this problem has been cited as the most common reason for deduction of medicines, operation report sheet, radiology, and laboratory.<sup>8</sup>

Another important cause for the hospital deduction found in the systematic review of studies is adding a request that occurs when the requested services do not match the cases, committed by the insurer organization<sup>11</sup> and derived from human errors; i.e., the errors in documentation and miscalculation (total difference). These deductions in the medicine section may be derived from numerous requests for medicine or the fact that insurance does not cover some medicines; besides, in the operation room ward they may be derived from the added request of surgery and anesthesia wage, requiring too much time for anesthesia services, and also the added request of adjusting codes.<sup>18</sup>

However, further large-scale studies are recommended for investigating the importance of the issue and the possible existence of other factors potentially contributing to hospital deductions and hospital income loss.

## CONCLUSION

The results of this review demonstrated that there are various causes for inpatient bills deductions, and paying attention to them can play an important role in the financial management of hospitals. Since many factors are related to providing a service and its reception by the customer is effective in deductions, this problem will not be solved unless implying fundamental actions and substantial strategies. Thus, to reduce these deductions, it is necessary to find several related approaches in collaboration with all stakeholders such as hospitals, insurer organizations, and experts in this field.

## CONFLICT OF INTERESTS

The authors declare that there is no conflict of interests regarding the publication of this manuscript.

## LIMITATION

It was difficult to find keyword for deduction word in English databases since it has no equivalent word in English.

## ACKNOWLEDGMENTS

This systematic review is the part of research that was financially supported by the Tabriz University of Medical Sciences. We appreciate all those who helped this research especially Dr. Vahide Zareh who helped us find the keywords.

## ETHICAL CONSIDERATIONS

This study was approved by the Ethical Committee of Research of Tabriz University of Medical Sciences: (Ethics No. 5/4/6078)

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