

The study of inpatient medical records on hospital deductions: An interventional study

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ABSTRACT

Background: The rate of hospital deductions is a commonly cited concern among teaching hospitals in Iran. The objective of the present study is to access the effect of the quantitative and qualitative analysis of inpatient medical records on deductions and identifying the major resources of deductions. There are currently no published interventional studies that have investigated this issue quantitatively. **Materials and Methods:** In an interventional study, we reviewed all the 192 patient's medical records (PMRs) for any documentation errors, to determine the rate of deductions. We conducted a pilot of 30 cases prior to the actual survey. Nonprobability-based consecutive sampling was used. The main study was conducted in three phases: 1. Primary evaluation; 2. Training, performance of intervention and corrective actions; and 3. Final assessment. Comprehensive assessments of medical records and follow-up of error correction were carried out systematically and according to the pre-set schedule. Pre- and post-intervention assessments were compared in order to evaluate the effect of the intervention. Data were analyzed using the SPSS-20 statistical software. Paired-sample *t*-test was used to compare changes in deduction scores before and after the intervention. Differences at a *P* value less than 0.05 were considered statistically significant. **Results:** In the initial survey of 800 PMRs, nearly one quarter (24%) (Or 192 cases) had at least one type of deduction. The three top types of deductions were Laboratory (47.9%), Medical radiation (45.3%), and Physician visit (35.9%). The results showed a 2.7- to about 36-fold lower rate of hospital deductions (average: 6.4-fold; reduction from 21131 to 3285 US dollars). **Conclusion:** All in all, the results of the present study indicated that educational interventions and quantitative and qualitative analysis of inpatient medical records are very beneficial and effective in the reduction of medical record deductions.

Key words: Hospital deductions, patient medical records, quantitative and qualitative assessment

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INTRODUCTION

A patient's medical record provides two important functions. The first is, it helps to support direct patient care by acting as an aide memoir for individual doctors by supporting clinical decision-making and providing an important means of communication.^[1] The second is, it provides a legal record of care given and acts as a source of data to support clinical audit, research, resource allocation, performance monitoring, epidemiology, and service planning.^[1-4] Today, the vast majority of allocated resources to the healthcare system are devoted to hospitals and health centers. Therefore,

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proper and efficient management of these resources is one of the important management tasks, to avoid wasting.^[5] In many countries, the lack of efficient management causes a waste of remarkable resources. Evidently, the correct use of hospital resources will be very profitable for the health system. Improving the hospital's efficiency with the available resources affects the best quality services. At the present time, when we are faced with a scarcity of resources, the importance of this issue is more apparent.^[6] Hospitals are considered the major healthcare provider organizations, as they use sophisticated technology and other factors. They have the main proportion of health system resources and due to the lack of efficacy, both in the costs and in income, they do not appropriate the use the resources and some of these resources are wasted. On account of this, it is necessary to manage the hospitals more economically, to prevent wasting the resources. Some plans for economic management of hospitals are manipulated and control over the financial status, supply the financial requirements and increasing the efficiency of hospital incomes.^[7] One of the hospital income sources, according to general insurance law, is providing and selling the services to the insured people who are covered by the insurance organization, but actually, in many ways, hospitals have problems with these organizations so in some cases, these organizations keep the hospitals in financial hardship.^[6] Excessive and unnecessary services by hospitals which is not accepted by the insurer to reimburse the cost of contracted-hospital bills are the cause of underlying discontent and delay in reimbursement by insurance organizations.^[7]

In the United States of America, Peer Review Organizations (PROs) are employed by the Health Care Financing Administration (HCFA) to maintain the integrity and solvency of the Medicare plans. Audits of the Medicare program, in 1998, indicated that more than \$12 billion dollars have been spent in inappropriate payments to hospitals, with over 25% attributed to the prospective payment system (PPS). Thereafter, the Payment Error Prevention Program (PEPP) was designed by the HCFA, in 1999, to manipulate PROs for reducing payment errors in PPS hospitals.^[8]

As one of the major causes of deductions in many cases is related to human error and failure to complete some original patient records, it seems that handling these problems can reduce some of the financial burden of hospital deduction. According to the aforesaid cases and due to the high range of hospital deductions, the need for more research on effective strategies to reduce the deductions and increase hospital efficiency and the satisfaction of hospital insurance organizations is evident. The present interventional study tries to determine the impact of qualitative and quantitative analysis of the cases (by a trained observer) on the rate of hospital deductions.

MATERIALS AND METHODS

This single-center study was a self-controlled trial conducted in a provincial educational hospital (Noor and Ali-Asghar

Medical Center, Isfahan, Iran), from August 2012 to June 2013.

The study was ethically and methodologically approved by the Research Committee of the Isfahan University of Medical Sciences.

We studied the medical records of 192 patients immediately after discharge from the hospital. The non-probability consecutive sampling method was used. A pre-study calculation of the required sample size was based on the sample size table that was recommended by Krejcie and Morgan.^[9] We reviewed each patient's medical record entirely for any documentation errors and to determine the rate of deductions.

Before starting the main study, we formed a research team and conducted a four-week pilot study. The goal was not only to establish how easy it was to use the trial, but also how effective it was as an audit and educational intervention. In addition, this study uncovered the potential problems and other serious errors in performance.

The other reasons for conducting this pilot were: Assessing the feasibility of the main study, preparation of the study protocol, identifying the logistical problems that might occur when using the proposed methods, and training of the research team members (including a medical expert, a methodologist, three members of the hospital staff, and two medical insurance office staff) in as many elements of the research process as possible.^[10]

The main study was done in three phases; the first phase started in October 2012. The primary data were collected by trained researchers (familiar with the documentation requirements in the personal medical records) by using a structured record review checklist:

- Background and clinical characteristics such as patient age, gender, duration of hospitalization, type of medical insurance, and related hospital wards, were checked
- Evaluating the accuracy and completeness of the personal information, aspects of proper documentation, incorrect information, or if there was no information at all
- Determine the rate of deductions, the various types of deductions, the causes and origins of deductions
- Aggregate the amount of deductions for each medical record
- Reassessment of the knowledge, skills, and abilities of the staff and review team on the documentation requirements, proper quantitative and qualitative analysis approaches, and the leading causes of deductions.

The activities in the second phase started with training of the review team members and data collectors in the last week of February 2013.

Pre- and post-tests were used to measure knowledge gained from participating in the training program.

The before-and-after comparison was applied to identify the changes in knowledge, skills, and abilities of team members.

The third phase of the study started in March 2013.

In this step, as in the first phase, the rate and type of deductions were recorded. This second review of medical records was completed after the final intervention and corrective actions — as far as possible. In addition, we also obtained the frequency of medical records with deduction.

The endpoint of the study was defined as the frequency and amount of deduction.

Data are presented as Mean ± SD for continuous variables and Number (percent) for categorical ones. The Shapiro–Wilk test was used for normality testing. The Paired-Sample *t*-test was employed to compare the mean of the deduction scores obtained on the first and second evaluations. The Spearman rank correlation coefficient and partial correlation test were used to analyze the relationship between the length of hospitalization (day) and the deduction score. All analyses were done using the Statistical Package for Social Sciences version 20 (SPSS Inc., Chicago, IL, USA) and *P* values less than 0.05 were considered significant.

RESULTS

In the initial survey of the medical records of 800 patients, nearly one quarter (24%) (or 192 cases) had at least one type of deduction. The basic and descriptive characteristics of these 192 PMRs are summarized in detail in Table 1.

Table 1: The basic features and descriptive characteristics of 192 under intervention medical records

Age (year)	51.3±20.3 [4-98]
Gender (male/female)	115/77
Average length of stay (day)	6.1±9.9 [1-67]
Types of medical insurance**	
Government employees	61 (32.4)
Self-employed	58 (30.9)
Rural dwellers	45 (23.9)
Others***	24 (12.8)
Hospital wards	
Internal medicine	61 (31.8)
Urology	28 (14.6)
Nephrology	21 (10.9)
Psychiatric unit	20 (10.4)
Toxicological unit care	20 (10.4)
Emergency medical unit	18 (9.4)
Coronary care unit	17 (8.9)
Others	7 (3.6)

Data are mean±SD [min-max], number and number (percent). **Based on The Medical Services Insurance Organization (MSIO)^[11,12]. ***Including: University students, Religious School students, and Martyr’s families. A martyr is a person who is put to death or endures suffering for their beliefs, principles or ideology (in Islam or Iran).^[12]

Figure 1 shows the flowchart of the study. This figure shows the number of PMRs that were entered in the intervention.

In this study, there was no relationship between the hospitalization period and the deduction rates (Spearman rank correlation coefficient: 0.08; *P* = 0.24). The result of the partial correlation showed that after controlling the effect of patient age, the correlation between the length of hospitalization and the deduction rate remained non-significant (*r* = 0.6; *P* = 0.42).

In this study, the 10 leading causes of hospital deductions, in rank order; are shown in Table 2. As is shown, the first three causes of deduction, in order of their importance included, ‘Lack of laboratory answer sheet’, ‘Lack of the nurse’s approval of medication usage’ and ‘Lack of Radiology answer sheet’ in the Patients Medical Records.

As is shown in Tables 3 and 4, the intervention could reduce the level of deductions up to six-fold (from \$ 21131 to \$ 3285). The results of present study showed that the intervention reduced the rate of hospital deductions — which was a commonly cited concern in teaching hospitals in Iran — up to six-fold (ranged from 2.7-fold to greater than 36-fold). These results showed a 2.7- to 36-fold lower rate of hospital deductions (from \$ 21131 to \$ 3285).

Both the number of PMRs with deductions and the mean of deduction scores had fallen significantly after performance of the intervention and corrective actions (all *P* values were less than 0.05).

The number of reported PMRs with deductions reduced from 192 to 95 cases after performance of the intervention; a 49.5% reduction. The greatest decrease in reported cases was observed for ‘Laboratory’ and ‘Physician visit’ subgroups (reduction of the number of PMRs with deductions: 74 and 65 cases, respectively). Also the number of PMRs with Consultation deduction and the mean of deductions score related to Consultation had reached zero.

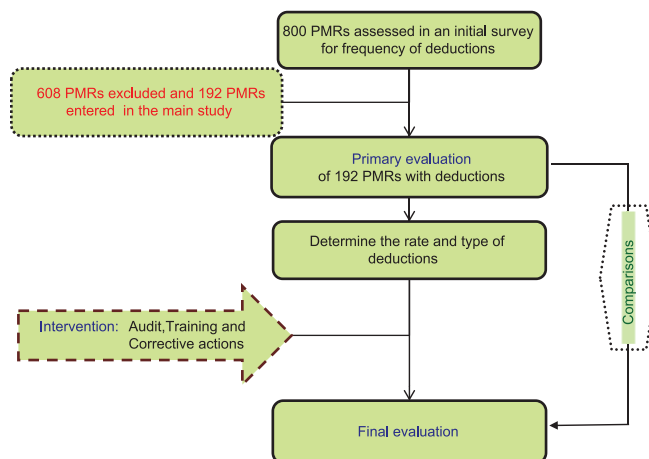


Figure 1: Study flow chart

DISCUSSION

It seems that the quantitative and qualitative analysis is an important means to improve the availability and quality of

Table 2: The type, related sheets, and the first 10 leading causes of deductions in the 192 inpatients' medical records

Deductions type	
Laboratory	92 (47.9)
Medical radiation	87 (45.3)
Physician visit	69 (35.9)
Medication	56 (29.2)
Surgery brokerage	40 (20.8)
Operating room	28 (14.6)
Inpatient beds	24 (12.5)
Anesthesia	24 (12.5)
Consultation	20 (10.4)
Other	53 (27.6)
Related sheet of deductions	
Laboratory report sheet	92 (47.9)
Physician's order sheet	54 (28.1)
Nurses' report sheet	54 (28.1)
Consultation sheet	20 (10.4)
Anesthesia record sheet	19 (9.9)
Preoperative anesthesia consultation sheet	2 (1.0)
Medical history sheet	1 (0.5)
Leading causes of deductions (the top ten causes)	
Lack of laboratory answer sheet in PMR	56 (29.2)
Lack of the nurse's approval of medication usage	39 (20.3)
Lack of radiology answer sheet in PMR	37 (19.3)
**Lack of the physician's approval ^[13-17]	36 (18.8)
Lack of date and time information	28 (14.6)
Lack of proper and timely request for medical radiation	24 (12.5)
Lack of proper and timely request for laboratory tests	23 (12.0)
Unreasonable failure to comply with a code of practice	21 (10.9)
Lack of radiology report sheet	21 (10.9)
Lack of pharmacy documentation in PMR	19 (9.9)

**Lack of the stamp and signature of the attending physician (or a senior resident or fellow). PMR=Patient medical record

information on deductions and to obtain a specific profile through a collaborative process, which can be used both for hospital administrators and health policy-makers.

The present study as a comparative and prospective self-controlled trial, compares the rate and frequency of deductions before and after the intervention (quantitative and qualitative analyses, training, and corrective actions).

The principal finding of this study is that in an unselected sample of hospital patients' medical records, the intervention could reduce the frequency of PMRs with deductions from 192 to 95 cases; nearly a 50% reduction. Also the intervention reduced the mean level of deductions up to six-fold (from \$ 21131 to \$3285).

Very few studies have been conducted on deductions, most of which are descriptive, cross-sectional, and retrospective in nature. These observational studies have investigated the frequency (prevalence) or amounts of deductions in PMRs.

In a qualitative study entitled, "Assessing issues and problems in a relationship between basic insurance organizations and university hospitals", the majority of the deduction burden was attributed to unfamiliarity with PMR documentation of the medical staff, young inexperienced staff, lack of coordination, and a surprising lack of training among the Medical Records staff.^[18] These findings are in-keeping with the Khalesi,^[19] Khorami,^[20] Tabatabai^[21] and Mohammadi^[22] investigations.

In a recently published cross-sectional study that was carried out on hospital bills in the Tehran University of Medical Sciences, the maximum amount of deductions belonged to the Laboratory, Materials, Medication, Accommodation, Surgery brokerage, and Anesthesia. And the leading cause of deductions was the staff's unfamiliarity with the medical documentation.^[23]

In a descriptive cross-sectional retrospective study conducted in the Seyed Alshahada Hospital in the second

Table 3: The characteristics of 192 under-study PMRs, before and after the intervention divided by type of deductions

Type of deductions	n ₁	Before Intervention				n ² (%)	After Intervention			
		Sum	Min	Max	Mean±SD		Sum	Min	Max	Mean±SD
Physician visit	69	1248.68	1.89	69.24	18.10±14.01	4 (2.1)	67.02	4.37	39.57	16.75±15.64
Surgery brokerage	40	4953.26	6.02	1264.68	123.83±251.41	8 (4.1)	1808.65	13.86	757.91	226.08±231.22
Operating room	28	931.23	3.01	297.49	33.26±71.56	4 (2.1)	268.55	6.93	138.57	67.14±63.60
Medication	56	1961.04	0.44	218.60	35.02±50.94	7 (3.6)	143.62	0.33	72.87	20.52±25.26
Consultation	20	356.11	13.19	39.57	17.81±7.74	0	-	-	-	-
Anesthesia	24	514.97	0.88	96.80	21.46±21.39	11 (5.7)	96.80	6.68	20.03	8.80±4.78
Laboratory	92	1086.76	0.99	273.88	11.81±29.08	18 (9.4)	111.99	3.27	14.83	6.22±3.68
Medical radiation	87	7854.03	2.99	791.62	90.28±182.45	69 (35.9)	613.79	1.17	170.68	8.90±31.67
Inpatient beds	24	1257.72	0	159.41	52.40±39.97	1 (0.5)	34.87	-	-	-
Other	53	1147.22	0.46	88.92	21.65±23.27	4 (2.1)	140.01	6.61	62.33	35±23.88
Total	192	21131.79	5.52	2066.37	110.06±212.86	95 (49.5)	3285.29	0.33	757.91	34.58±98.71

Data are presented as number, number (percent), and mean±1SD. **All currency values are in US dollars (\$), based on the world's favorite currency site; Available at: <http://www.currency.me.uk/>. Accessed at: Jun 05, 2013 15:03 Universal Time-Coordinated (UTC); (1 USD=12282.6 IRR)

Table 4: Comparison of the deduction score (in US Dollars), before and after the intervention in 192 medical record cases**

Type of deductions	Mean±SD		P value	Reduced rate (times)
	Before intervention	After intervention		
Physician visit	6.47±0.87	0.35±0.22	<0.0001	18.5
Surgery brokerage	25.66±8.92	9.37±4.55	0.001	2.7
Operating room	4.83±2.11	1.39±0.90	0.007	3.5
Medication	10.16±2.27	0.74±0.42	<0.0001	13.7
Consultation	1.85±0.43	0	<0.0001	-
Anesthesia	2.67±0.74	0.50±0.17	0.001	5.3
Laboratory	5.65±1.50	0.58±0.15	0.001	9.7
Medical radiation	42.11±9.44	3.18±1.39	<0.0001	13.2
Inpatient beds	6.52±1.60	0.18±0.18	<0.0001	36.1
Other	6.10±1.12	0.73±0.42	<0.0001	8.4
Total	109.49±15.29	17.02±5.13	<0.0001	6.4

The average data are mean of deduction score per each medical record. The corresponding *P* values calculated by The paired-sample *T*-test; and all statistical analyses and *P* values were confirmed by non-parametric Wilcoxon signed ranks test. ** Based on the world's favorite currency site; Available at: <http://www.currency.me.uk/>. Accessed at: Jun 05, 2013 15:03 UTC. (1 USD=12282.6 IRR)

six months of 2007, most causes of deductions had a direct correlation with organizational mistakes made by the hospital staff.^[24]

Tavakoli and colleagues, in a retrospective study on 333 PMRs, found that the most frequent rate of deduction was related to medication (40%) and the least frequent rate pertained to consultation (10.6%). In this survey, 'incomplete and inaccurate documentation of hospitalized patients' records by care providers' was identified as the leading cause of deductions.^[25]

According to the aforesaid studies and taking into account our findings, educational interventions, analysis of PMRs, and corrective actions are very beneficial and can be effective for preventing unintended errors on documentation and rate of deductions.

Some supplementary studies with a larger sample size are needed to evaluate the real effect of any other type of intervention on deductions.

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