



## ORIGINAL ARTICLE

# Quality improvement of medical records through internal auditing: a comparative analysis

E. AZZOLINI<sup>1</sup>, G. FURIA<sup>2</sup>, A. CAMBIERI<sup>3</sup>, W. RICCIARDI<sup>4</sup>, M. VOLPE<sup>3</sup>, A. POSCIA<sup>5</sup><sup>1</sup>Humanitas Clinical and Research Center - IRCCS, Rozzano (Milan), Italy; <sup>2</sup>Local Health Authority Roma 1, Rome, Italy;<sup>3</sup>Healthcare Management - Fondazione Policlinico Universitario "A. Gemelli", Università Cattolica del Sacro Cuore, Rome, Italy;<sup>4</sup>Department of Public Health, Università Cattolica del Sacro Cuore, Rome, Italy; <sup>5</sup>UOC ISP Prevention of Infectious and Chronic Diseases, Department of Prevention, Area Vasta 2, Regional Health Authority, Marche Region, Italy

## Keywords

Medical records • Clinical audit • Quality improvement • Quality of healthcare

## Summary

**Introduction.** *The systematic evaluation of the quality of medical records is crucial. Nevertheless, even if the improvement of medical records quality represents a priority for every health organization, it might be difficult to realize.*

*This is the first study to assess the efficacy of internal audit as a tool to improve the quality of medical records in hospital setting.*

**Methods.** *The program was carried out in a third level teaching hospital. Trained ad hoc evaluation teams carried out two retrospective assessments of quality of medical records using a random sampling strategy. The quality assessment was performed using a 48-items evaluation grid divided into 9 domains: General; Patient Medical History and Physical Examination; Daily Clinical Progress Notes; Daily Nursing Progress Notes; Drug Therapy Chart; Pain Chart; Discharge Summary; Surgery Regis-*

*ter; Informed Consent. After the first evaluation of 1.460 medical records, an audit departmental program was set up. The second evaluation was carried out after the internal auditing for 1.402 medical records.*

**Results.** *Compared to the first analysis, a significant quality amelioration in all the sections of the medical chart was shown with the second analysis, with an increase of all the scores above 50%. The differences found for each section of medical records between the first and second analysis are all significant ( $p < 0.01$ ).*

**Conclusions.** *Internal audits are not just measurement activities but a necessary activity to support the organization in achieving its objectives and assessing the quality of clinical care and maintaining high quality professional performance*

## Introduction

With the increasing numbers of observations documented about patients in their records, clinicians are faced with an overwhelming amount of data, registries and charts. This phenomenon has been observed in several care settings, from outpatient clinics to hospital admissions, for each care process and all the medical departments [1]. Over the last decades, it became increasingly interesting to measure the quality of health care and hospital documentation in order to strengthen both transparency, continuity of care and accountability which are essential targets of the health systems. In this context, governments, scientific associations, hospital directorates as well as insurance companies released quality indicators for various kinds of hospital admissions, investigated through medical records' data [2].

In the actual economic context, with increasing health needs, efficiency and efficacy represent fundamental keyword to ensure a successful use of the resources and the best health outcomes. Furthermore, medical record, completely and correctly compiled, is an essential tool in the patient diagnostic and therapeutic path, aimed to facilitate continuity of care and patient safety and promote structured and effective communication between caregivers. Inadequate

communication between different health professionals is associated with discontinuity of care, which can lead to errors [3-6]. The consequences of discontinuity of care are linked to increased cost and length of hospital stay, readmissions, poorer patient satisfaction, adverse events, delays and mistakes in treatment and diagnosis [7]. Furthermore, proper management of health records and accurate, comprehensive record-keeping is becoming more and more essential for the administrative reporting and legal claims as well as an absolute condition for any structure that wants to be an excellence within a health system [8]. The systematic evaluation of the quality of medical records is crucial, emphasizing the role that an accurate, readable and accessible medical record can play in reducing medical errors and increasing integration between the different ways of assistance and the efficiency of delivery of services [9].

Nevertheless, even if the improvement of medical records quality represents a priority for every health organization, they may find that difficult to be realized. Through the tools of clinical governance, aimed to promote the change in a health care organization, audit seems particularly suitable [10]. Furthermore the Italian Ministry of Health supports the importance of promoting the systematic and continuous adoption of audit in all

areas of the National Health Service to develop the ability to assess, innovate and meet the expectations of patients and professionals, in a constantly changing reality [11].

Through audit, hospital management should therefore encourage a better quality in clinical documentation to improve the quality of health services and the standard of clinical practice.

Aim of this study is assessing the differences of medical records' quality before and after internal audit in an Italian third level teaching hospital.

## Methods

### TEAM OF ANALYSIS AND SELECTION OF SAMPLE

Two different evaluation teams trained *ad hoc* carried out in 2013 (June-November) and 2015 (July-December) a retrospective assessment of quality of medical records. The teams were composed of 3 physicians and 1 nurse, supervised by the hospital's health directorate. The sample, selected using a random sampling strategy, is representative of at least 3% of the total amount of hospitalizations of the previous year, in accordance to the criteria provided in the most recent guidelines by the body checking [12]. In order to ensure an equitable distribution of the sample among the wards, a proportional selection of medical records based on the number of admissions of the previous year for each ward has been made.

### ASSESSMENT METHODOLOGY

The quality assessment was performed using a 48-items evaluation grid divided into 9 domains: General; Patient Medical History and Physical Examination; Daily Clinical Progress Notes; Daily Nursing Progress Notes; Drug Therapy Chart; Pain Chart; Discharge Summary; Surgery Register; Informed Consent. A more detailed description of the instrument is published elsewhere [13]. The items were expressed as yes/no questions. 1 point was assigned if the item was satisfied, 0 if not. Considering the different types of medical department, if one (or more) item was not applicable, 99 was assigned and it was excluded from the analysis. A guide of the analysis with the criteria of assessment was built in order to support the teams and standardize the analysis.

The overall and specific area scores were calculated as proportions of satisfied items excluding the not applicable ones:

$$\text{Score} = \frac{\text{Number of items satisfied}}{\text{Total of evaluable items}}$$

Therefore the final score can be shown as percentage (0% if none of the evaluable items were satisfied, 100% if all the evaluable items were satisfied).

The results obtained were aggregated by the evaluation teams for each ward and medical department, preparing specific report showing the aim of the analysis, methodology, results and conclusion as well as possible future actions and further issues.

### AUDIT

An audit departmental program was set up between November 2013 and June 2014, after the first evaluation of medical records, in order to share the results with the personnel of the departments investigated and promote the culture of transparency and accountability. Audit were structured following the 4 phases proposed by the Italian Ministry of Health [11] and English National Health Service [14] to facilitate the understanding of organizational processes and identify the best interventions to improve the quality of hospital documentation. According to the NHS score, our audit model could be considered a good project (score of 20/25).

The first part of audit consisted of showing the methodology used and a sample of medical records to replicate the assessment. In the second part participants were divided in small groups and invited to actively discuss the results, identify the weaknesses and define the cause of problem (professional, organizational or structural). Finally a report of the meeting was recorded and a satisfaction questionnaire was administered to all the participants. The questionnaire's items are listed in Table I.

### STATISTICAL ANALYSIS

In both analysis (2013 and 2015), data were collected in a Microsoft Office Excel 2010 database where frequencies, means and percentage scores were calculated. An overall score was computed for the hospital (total score). Separate specific scores were calculated for each investigated area. Scores were compared before and after the internal departmental audit with independent t test, using the Stata/SE version 10.1 package.

## Results

In 2013 and 2015 respectively, 1.460 and 1.402 medical records were evaluated, representative of almost 3% of hospitalizations.

The results coming from the first analysis in 2013 showed a good accuracy in the surgical area (90.2% of items satisfied), informed consent (77.7% of items satisfied), discharge summary (71.4% of items satisfied) and general part (69.5% of items satisfied). Below the overall hospital mean (59.5% of items satisfied) the patient medical history and physical examination (50.9% of items satisfied), daily nursing and clinical progress notes (54.7% and 47.2% of items satisfied, respectively), drug therapy chart (40.3% of items satisfied) and finally the pain chart (only 29.3% of items satisfied) were found. The most common criticality across all the areas lies in

Tab. I. Items of the Audit Program Satisfaction Questionnaire.

n	Question
1	Were the aims and methods of the audit clearly conveyed?
2	Did the team leading the audit show expertise in the examined area?
3	Were you able to understand the essential issues and the main problems?
4	Were you able to express your opinion during the audit and fruitfully interact with the leading team and colleagues?
5	Generally, how would you rate the professional enhancement gathered from the audit?
6	Generally, how would you rate the efficacy of the audit?
7	Do you consider the methods learned during the audit useful to better evaluate your own activity?
8	Did/will you intend to share the audit contents with colleagues who did not participate?
9	Do you consider the methodology of evaluation of appropriateness (PRUO) feasible and repeatable?
10	Do you consider the methods of quality assessment feasible and repeatable?
11	How do you feel important a complete and accurate clinical documentation?
12	How do you feel important that the hospitalization fits the appropriateness criteria in addition to the clinical criteria?
13	Do you consider helpful the support given by the Health Directorate to address and improve these issues?
14	Do you consider that the final recommendations gathered from the audit are practical, repeatable and effective in your activity?
15	Do you consider worthwhile to include in the budget targets a systematic assessment of quality and appropriateness?
16	Was the audit duration reasonable?
17	Was the interval between the first and the second audit adequate?
18	Do you consider additional meetings on this topic necessary?
19	If yes, would you prefer practical or theoretical meetings?
20	Do you believe that other professional figures should be involved?
21	If yes, specify who
22	Do you consider the audit a useful tool and helpful to improve the system?
23	Any further comments

the signature lack by health professionals, especially physicians.

In order to share and discuss the results with the personnel, 34 audit were carried out: in 16 audit entire departments were reached and a theoretical approach was adopted while 18 audit were organized to reach small groups of operators, though interactive discussions. 351 physicians and nurses were reached. The overall satisfaction score was 3.3 (score scale between 1 and 4; 1 = inadequate; 4 = excellent) and most of participants (92%) indicate the available time as congruent with the purpose. Furthermore, 99% of participants considered audit a useful tool for continuous improvement of hospital care quality, 93% would appreciate to be involved in additional audit, especially with a practical approach (as in the second part of the audit).

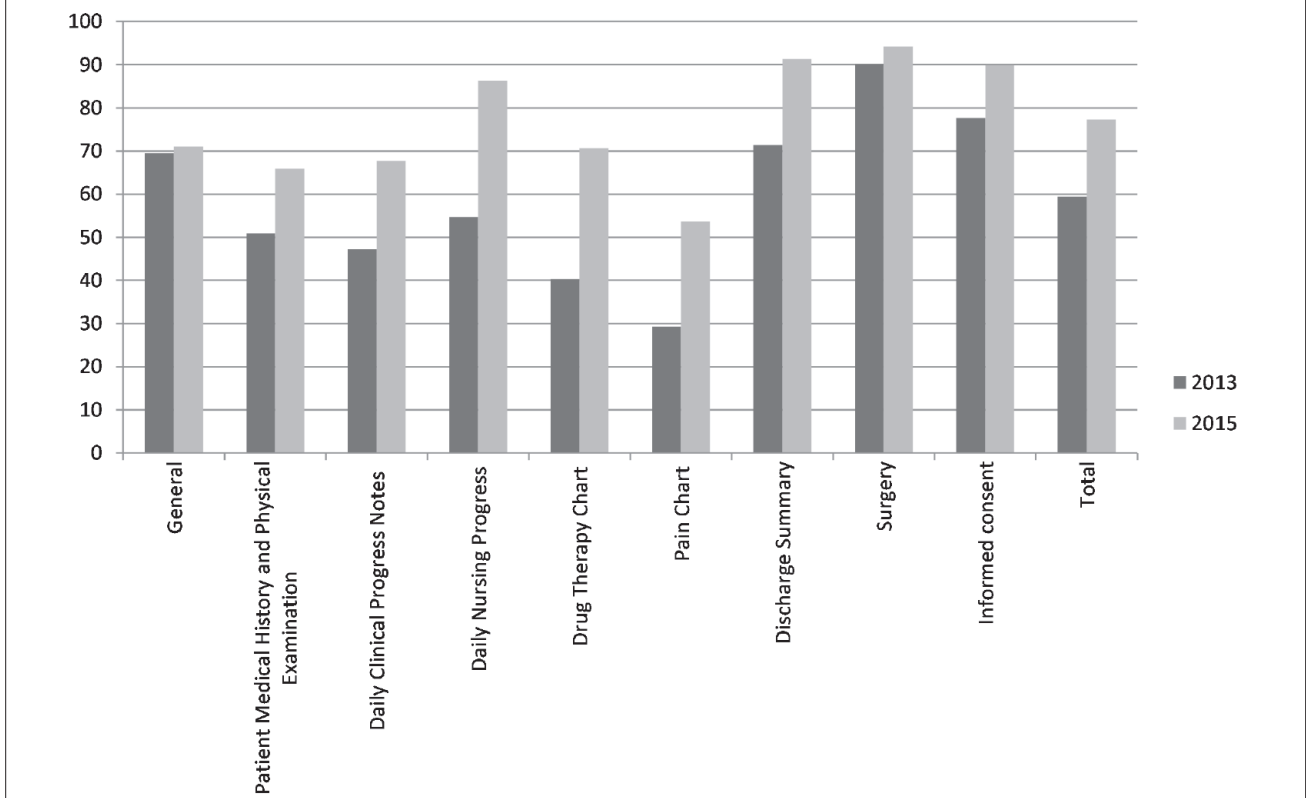
The second evaluation in 2015, after audit, showed a general improvement in all the sections of medical records investigated compared to the first analysis, with an increase of all the scores above 50%. The overall total score of the hospital increased of almost 20%, from 59.5% to 77.3%. The surgical area, informed consent and discharge summary areas increased to 94.2%, 91.4% and 89.9%, respectively, followed by the daily nursing progress notes (86.3%), general part (71.0%), drug therapy chart (70.7%), daily nursing and clinical progress notes (67.7%), patient medical history and physical examination (65.9%) and pain chart (53.6%) (Fig. 1). The differences found for each section of medical records between the first and second analysis are all significant ( $p < 0.01$ ).

## Discussion

This study shows a significant amelioration in the quality of medical records before and after an internal audit program carried out in a third level teaching hospital. The baseline quality assessment performed in 2013 showed several deficiencies, due to 40% of minimum level of acceptability not completely satisfied with great discrepancies among departments and among Care Units.

These findings are consistent with those described in previous studies. Attena et al in 2010 reported a quality of compilation quite far from the reference standard value of 100%, with the worst data concerned the completeness of the physical examination (56.2%) and the low presence of the patient chart (12.9%) and the discharge summary (18.0%). Important differences were found across the diseases for various items and higher accuracy was found in teaching hospitals and some private hospitals [15]. In 2002 a study carried out in various Italian Regions by the Agency for Regional Health Services showed that only 0.5% of the medical records fully satisfy the 26 quality criteria and even in the hospital with the best performance, the indicator of acceptability stopped at the value of 6.7%. The main deficiency was represented by the traceability of signatures in the medical journal [16]. This remains a problem still in the present study, with the quality of the pain assessment (29.3%) and the completeness of the Drug Therapy Chart (40.3%) that represent the greatest concern before the intervention.

Fig. 1. % of medical records fulfilling the quality items for each domain before (2013) and after (2015) audit program.



Two years later, the overall hospital score and all the areas investigated showed a significant improvement, in some cases reaching an increase higher than 30%, such as for the the Daily Nursing Progress Notes (+31.6%) and the Drug Therapy Chart (+30.4%). However, this cannot be considered completely satisfactory because, as known, the criteria of completeness, clarity and legibility must be entirely satisfied. Nevertheless, none of the investigated domains shows a worsening and the progresses are higher than previous reported. Attena et al. in 2010 evaluated and implemented a medical records quality program sending a letter to each ward containing their specific results and the guidelines to fill out the medical record correctly [17]. In their follow up evaluation, they found several, but modest, improvements. Furthermore, they reported some worsening in the sections regarding the completeness of information and clarity of handwriting of patient charts and in the completeness and legibility of the clinician's signatures. These findings could be partially explained by the adoption of audit as the tool for showing and discussing the problem related to the quality of medical records. As a matter of fact the active feedback engaged the interest of the clinicians and received a good appreciation from the involved health professionals, which declared a professional enrichment and required further meeting [13].

This study deal with a very relevant topic for all the health care organizations, both for clinical, and for economic reasons. Dunlay et al found that medical records for patients with Acute Coronary Syndromes often lack key elements of the history and physical examination

and that patients treated at hospitals with better medical records quality have significantly lower mortality and may receive more Evidence Based Medicine [18]. Furthermore, Farhan et al showed a positive correlation between the accurate documentation and correct coding [19]. The positive relationship between better medical charting, coding accuracy and good medical care should lead the hospital medical directorates to increase their efforts towards the amelioration of the quality of medical records. Several organizations have provided hospitals and health systems with guidelines for clinical documentation improvement programs, but there is evidence of strong disparities among hospital about the level of adoption of these guidelines.

To the best of our knowledge this is the first study to assess the efficacy of audit as a tool to improve the quality of medical records in hospital setting and it is one of the main strength of our program. As a matter of fact, Attena et al. failed to implement an intervention for improvement by the active and direct involvement of the operators (plenary meetings with all the operators, presentation of the results of the first survey, illustration of the guidelines of correct compilation, discussion), and they adopted an approach by written communication.

Audit has been used in different health care contexts to evaluate patient care from assessment through outcome [20, 21]. It is a useful tool in improving the quality of care provided by a health service across the organization, both in surgical [22] than in clinical setting. Furthermore, audit and feedback can be effective in improving professional practice, as well as an effective



way to stimulate clinicians to keep going in continuous improvement [23].

The benefits of undertaking internal audit are promotion of good practice, providing opportunities for training and education, better use of resources and increase in efficiency. In time of financial constraint it could be useful to reduce the health care costs [24]. However patient outcomes were less likely to be influenced by audit and feedback interventions and its real impact especially is still controversial [23, 25].

Another key factor of our program is represented by the use of a quantitative, reliable and validated tool to assess the quality of medical records of all the wards of the hospital. Anyway this study has some limitations. The first is represented by the study setting. The third level hospital where the study was conducted has a peculiar legal framework for the Italian context, being both a teaching and private hospital, highly competitive and with a high propensity for quality improvement programs. This could lead to an overestimation of the audit effect and limit the generalizability of the results. Secondly, the follow up was limited to one year after the program implementation. This means a good result in the short and middle period, but little is known about long-term effects.

Bearing in mind that one of the main obstacles to the quality improvement is represented by the resistance to modify well-established behaviors, the obtained improvement should be maintained promoting an integrated approach based on continuative evaluation and appropriate trainings.

## Conclusions

Internal quality assessment could be used as one of the departmental performance indicator and every clinicians could use the 48-items evaluation grid could as a useful instrument to assess the quality of a sample of its own medical records. Waiting for the full development and application of the electronic medical record that should improve the quality of clinical documentation, our results suggest the importance of actively involve health professionals in audit, giving them formal responsibilities for improving the quality of clinical documentation.

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## Conflicts of interest statement

None declared.

## Authors' contributions

Study design: EA, GF and AP. Data collection: EA, GF and AP. Data analysis: EA and AP. Study supervision: AC and MV. All authors gave substantial contribution to manuscript revising and editing.

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**Correspondence:** Elena Azzolini, Humanitas Clinical and Research Center, IRCCS, via Alessandro Manzoni 56, 20089 Rozzano (MI), Italy - Tel. +39 02 8224 2429 - Fax +39 02 8224 2299 - E-mail: elena.azzolini@humanitas.it

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