Check for updates

Research Article

HIMJ

Health Information Management Journal
1–10
© The Author(s) 2025
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/18333583251364304
journals.sagepub.com/home/himj
Sage

Medical record-keeping training for undergraduate medical students in pre-clinical years: An experiment for program effectiveness and student satisfaction

Emre Emekli, *MD, PhD*[1,2]
Özlem Coşkun, *MD*[2]
Vildan Özeke, *PhD*[3]
Yavuz Selim Kıyak, *MD, PhD*[2]

Abstract

Background: Proper clinical record-keeping is critical for effective communication, quality control and legal compliance in health care. Despite its importance, studies indicate that physicians often lack adequate documentation skills. Current medical curricula primarily address these skills during clinical years, leaving pre-clinical students underprepared. **Objective:** This study aims to describe the implementation of a clinical record-keeping training program for pre-clinical medical students and evaluate its outcomes. **Method:** This experimental study had a non-randomised controlled pre- and post-test design. The study involved implementing a 12-week training program for pre-clinical students, consisting of lectures and standardised patient interviews. A control group of students who received only the traditional curriculum was included for comparison. Pre-test and post-test assessments were conducted, and student satisfaction with the program was evaluated through a questionnaire. **Results:** Results indicated a significant improvement in clinical record-keeping scores among students who received the new training program compared to the control group. Student satisfaction with the program was also positive. **Conclusion:** Results demonstrated that early clinical record-keeping training significantly enhanced the skills and preparedness of pre-clinical students for their clinical years and eventual professional practice. Initiating such training during the pre-clinical phase is crucial for ensuring the development of competencies essential for effective healthcare delivery. **Implications for health information management practice:** Introducing structured record-keeping education before clinical exposure can bridge skill gaps early, foster better documentation habits, and ultimately improve the quality of health information management across healthcare systems. This strategy may also lead to improved clinical efficiency and patient care quality in the long term.

Keywords (MeSH)
hospital records; systematic review; efficiency; health information management

Supplementary keywords
clinical record-keeping; pre-clinical medical students; medical record; medical education

Introduction

Medical record keeping plays a pivotal role not only within hospital settings but across the entire spectrum of health-care services. Medical records are equally essential in primary health care, specialist outpatient clinics, emergency care and in services provided by allied health professionals such as nurses, physiotherapists and pharmacists (Kuhn et al., 2015). Comprehensive documentation ensures the coordination of care between different levels of the

[1]Eskişehir Osmangazi University, Türkiye
[2]Gazi University, Türkiye
[3]Gaziosmanpasa University, Türkiye

Accepted for publication July 18, 2025.

Corresponding author:
Emre Emekli, Assistant Professor, Faculty of Medicine, Health Practice and Research Hospital, Eskişehir Osmangazi University, Büyükdere Mah, Meşelik Kampüsü, Odunpazarı, Eskişehir 26040, Türkiye.
Email: emreemekli90@gmail.com

healthcare system and supports communication among healthcare providers from diverse disciplines (Rowlands et al., 2016). Moreover, accurate and timely record-keeping is fundamental for patient safety, continuity of care, quality assurance and serves as legal documentation in all healthcare settings, whether ambulatory or inpatient (Gliatto et al., 2009; Kuhn et al., 2015). In many countries, medical records are also indispensable for health system management, billing and quality audits (Haghighi et al., 2014; Jackson, 2014).

Medical records represent a dynamic process in the healthcare system. All materials used in this process are referred to as medical records (Comeau and Craig, 2014). These records can be defined as written documents or electronic records containing patients' symptoms, history, laboratory and imaging results, as well as notes on treatments. These records play a critical role in facilitating effective communication and coordination among physicians and other healthcare professionals, while also serving as legal evidence (Rowlands et al., 2016; Seo et al., 2016). Proper maintenance of medical records has fundamental importance, such as ensuring the proper functioning of the healthcare system and enabling secure communication among the team within the hospital (Kuhn et al., 2015). In addition, clinical records serve as important tools in hospital clinical audits and quality control processes. While there may be national differences, in some countries, they are used as a fundamental basis for billing and financial transactions (Haghighi et al., 2014; Jackson, 2014; Seo et al., 2016).

It is important for physicians to maintain medical records accurately in a timely manner for all these reasons, and in addition, it is a legal responsibility that enhances the effectiveness of healthcare services. However, according to studies, physicians may have inadequate knowledge in this regard (Finn et al., 2007; Nadeem et al., 2017; Seo et al., 2016; Vahedi et al., 2018; Yılmaz et al., 2017). Research has also highlighted that the absence of formal education may drive students to rely on alternative resources, such as YouTube, which often lack reliable instructional quality (Emekli and Kıyak, 2024). From all these perspectives, and to equip students with the ability to communicate effectively with patients, medical record training is essential. International medical education committees and the Association of American Medical Colleges recommend including specific training in communication skills for physicians in medical school curricula (Association of American Medical Colleges, 2014; Medical School Objectives Writing Group, 1999).

Teaching students clinical record-keeping skills not only strengthens communication in hospitals but also prepares future physicians for their professional life after graduation. In addition to improving communication, accurate and timely medical record keeping is crucial for ensuring patient safety, supporting clinical audits and quality control processes, and facilitating coordination both within hospitals and across different healthcare settings (Kuhn et al., 2015; Rowlands et al., 2016). Moreover, medical records serve as essential legal documents, providing medicolegal evidence in cases of dispute or litigation (Gliatto et al., 2009). Comprehensive record-keeping is also important for financial processes such as billing and reimbursement (Haghighi et al., 2014; Jackson, 2014), and plays a key role in scientific research, enabling the use of real-world data for education and evidence-based practice (Mamykina et al., 2012; Smith et al., 2018). This education enables students to document clinical encounters accurately and effectively, thus allowing them to provide quality service in medical practice (Association of American Medical Colleges, 2014; Liaison Committee on Medical Education, 2023). For all these reasons, clinical record-keeping training should have a prominent place in medical education, and students should be equipped with this skill as early as possible. However, the existing literature primarily focused on conducting studies with resident physicians from various medical specialties (Comeau and Craig, 2014; Meidani et al., 2017; Momin et al., 2016; Vahedi et al., 2018). In addition, a significant portion of studies targeting students has been carried out during the clinical phase of their education (Finn et al., 2007; McLean et al., 2015; Owen et al., 2015; Weber et al., 2022; Yu et al., 2018).

There are limited studies addressing students' clinical record-keeping training needs in the pre-clinical phase (Kusnoor et al., 2022; Olvet et al., 2022; Wagner et al., 2006; Wagoner et al., 2022). Therefore, the aim of this study was to describe the implementation of a clinical record-keeping training program for pre-clinical medical students and evaluate its outcomes.

Method

This experimental study had a non-randomised controlled pre- and post-test design. Ethical approval was obtained from the Gazi University Ethics Committee (Decision no: 2022-958, Date: 4 October 2022). Written consent was also obtained from the students before the study.

Participants

The training was conducted at the tertiary care hospital of Gazi University Faculty of Medicine. As the intervention group, third-year students (pre-clinical phase) of the Faculty of Medicine in the academic year 2022–2023 were invited to participate voluntarily. The control group consisted of fourth-year students (clinical phase) from the same academic year. Participation was voluntary due to the experimental nature and scheduling constraints of the training program. In the faculty training program, fourth-year students had paediatric, internal medicine, chest diseases, general surgery and obstetrics and gynaecology rotations. In these rotations, the theoretical and practical sessions include clinical record keeping among other skills. Students who successfully completed the first two rotations and presented at least two patient files were invited to participate in the study as the control group.

Study design

A training program was prepared based on the results of the needs analysis previously conducted at the hospital (Emekli

et al., 2023). We benefitted from the Kern model in the development of this program. The Kern model is a widely used, systematic framework for curriculum development in medical education, which involves six steps: problem identification and general needs assessment, targeted needs assessment, defining goals and objectives, selecting educational strategies, implementation and evaluation and feedback (Thomas et al., 2022). The intervention group continued to attend their regular pre-clinical courses in parallel with participation in the clinical record-keeping training program. The training was designed as an additional program to their standard curriculum, not as a replacement. After completing the intervention, these students continued with their medical education, progressing into the clinical phase with the rest of their cohort. Participation in the training did not exempt students from any part of their usual coursework. As a pilot implementation, the training program was implemented for five voluntary sixth-year students over 1 day. The morning sessions involved theoretical lectures and feedback sessions. Standardised patient interviews were conducted in the afternoon sessions. As a result, the training program was planned to last for 12 weeks, with the first 7 weeks consisting of theoretical lectures and the following 5 weeks consisting of small group sessions (Box 1). During the first 7 weeks, theoretical lectures were delivered to students in sessions lasting approximately 30–40 minutes each. For the subsequent 5 weeks, students were divided into three groups. Five sessions were conducted with each group, including standardised patient interviews. These sessions lasted approximately 1 hour each. During these sessions, each student conducted at least one standardised patient interview, wrote a patient history and prepared a consultation note as if requesting advice or input from another medical specialist for the case. This task simulated the process of referring a patient to another department or specialist within the healthcare system, as is commonly practiced in clinical settings. The whole process of the experiment is presented in Figure 1.

In our 6-year undergraduate medical program, the first 3 years (pre-clinical phase) consist primarily of basic science education with minimal patient exposure. Clinical training begins in the fourth year (clinical phase), where students start rotations in major hospital departments and participate in patient care activities, including clinical record-keeping. In the pre-clinical period at our Medical Faculty, legal responsibility of the physician lectures was taken regarding clinical record-keeping and history-taking. However, primarily, clinical record-keeping courses were offered during the clinical period at our Faculty. In each of the paediatric, internal medicine, general surgery and obstetrics and gynaecology rotations, theoretical courses on history-taking were provided and bedside sessions related to taking patient histories and performing physical examinations were also available. Therefore, in this study, third-year students who had not yet started clinical rotations were included in the intervention group, while fourth-year students, who had already started their clinical rotations, served as the control group.

Box 1. Educational intervention course schedule.

Weeks	Lectures
Pre-test	Watching standardised patient video recordings
1. Week	Medical record
2. Week	Physicians' obligation to maintain medical records
3. Week	Paper-based records and electronic records
4. Week	Types of medical records
5. Week	SOAP/APSO record-keeping methods
6. Week	Consultation notes
7. Week	Quality of medical records
8. Week	Small group: Taking history from a standardised patient – 1
9. Week	Small group: Taking history from a standardised patient – 2
10. Week	Small group: Taking history from a standardised patient – 3
11. Week	Small group: Discussion of standardised patient history notes – 1
12. Week	Small group: Discussion of standardised patient history notes – 2
Post-test	Watching standardised patient video recordings

Data collection process and evaluation

The intervention group (third-year students) participated in both pre-test and post-test assessments because they had not yet been exposed to the standard clinical curriculum. For the control group (fourth-year students), who had already commenced clinical rotations and formal teaching on clinical record-keeping, it was not feasible to conduct a pre-test, as they had already begun clinical exposure by the time of data collection. Therefore, only a post-test was administered to the control group for comparison. Performance assessment was conducted based on videos of patient-physician interactions conducted with standardised patients in a clinic setting by a physician. Four different scenarios and four different standardised patients were recorded by a physician. For the assessment, two of these videos were selected: one video was used exclusively for the pre-test and a different video was used for the post-test. The post-test for the intervention group and the assessment for the control group were both performed using the same standardised patient video scenario. This method was chosen to minimise learning or recall bias that could occur if the same video were used for both assessments. Both videos were reviewed and scored by the same faculty members using the same evaluation criteria to ensure consistency.

The procedure for both pre-test and post-test assessments was identical: students watched a standardised patient video, took notes and wrote a consultation note, which were then evaluated using the same combined Clinical Record Keeping Evaluation Form. Different video scenarios were used for pre-test and post-test to minimise recall bias. All records (from both the intervention and control groups, and for both pre-test and post-test) were

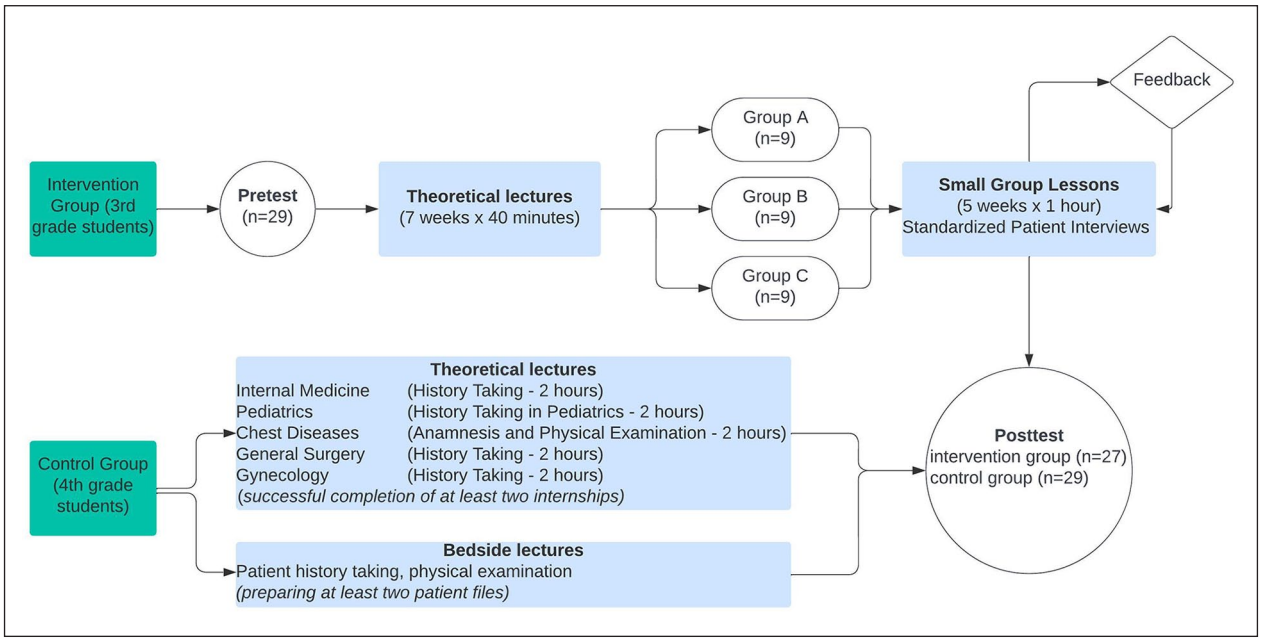


Figure 1. Schematic representation of the educational intervention plan.

evaluated by the same two faculty members, in order to maximise consistency and reduce inter-rater variability.

An evaluation form was created for the assessment of clinical records kept by students in the performance assessment session conducted with video recordings. QNOTE for assessing history records and PDQI-9 for assessing consultation notes were used as the basis for the evaluation form (Burke et al., 2014; Glisson et al., 2011). This evaluation form consisted of two distinct parts: (1) the Clinical History Evaluation Form (adapted from QNOTE) and (2) the Consultation Note Evaluation Form (adapted from PDQI-9), resulting in a combined form with 11 items in total. Both forms were sent to five faculty members to obtain their opinions on the validity of their use in evaluating video recording notes. Faculty members were asked to assess the items in terms of comprehensibility, relevance to the purpose and applicability. It was observed that the QNOTE form for third-year students, which contains 12 headings, was too detailed, especially in the Assessment, Treatment Plan, Follow-up Information headings, and students may not have sufficient knowledge in these headings due to a lack of clinical experience, not in terms of clinical record-keeping. Therefore, these 3 headings were combined into one, and the evaluation form, along with the PDQI-9 form, consisted of 11 headings (Appendix: Clinical Record Keeping Evaluation Form). Each student in both the intervention and control groups had their clinical record-keeping performance evaluated using the combined Clinical Record Keeping Evaluation Form. Each student's written records were independently assessed by two faculty members. The final evaluation score for each student was calculated as the average of the two assessors' scores. In addition, at the end of the process, a questionnaire was administered to assess students' satisfaction with the program, including topics such as achieving program objectives, educational methods, scope of the program, duration and management of the classes, evaluation of the trainers and overall satisfaction. The questionnaire included a 5-point Likert scale for each statement. Participants were given 2 weeks to complete the survey via Google Forms after the training program.

In evaluating the effectiveness of the training program, we applied the Kirkpatrick Model, a widely recognised framework for assessing educational interventions in healthcare and professional training. According to this model, our study included evaluations at two levels:

- Level 1 – Reaction: Students' satisfaction with the training program was assessed through a post-training questionnaire covering aspects such as perceived achievement of learning objectives, teaching methods, course content, session structure and instructor performance.
- Level 2 – Learning: Objective learning outcomes were evaluated through a performance-based assessment, where students' clinical record-keeping skills were measured using pre-test and post-test written documentation tasks scored via a structured evaluation rubric adapted from validated tools (QNOTE and PDQI-9).
- Levels 3 and 4 (behaviour and results), which involve long-term behaviour change and system-level impact, were beyond the scope of this study due to its short-term design and lack of follow-up (Kirkpatrick, 1996).

Statistics

Descriptive statistics were used to express numerical variables from the data obtained from the satisfaction survey as mean ± standard deviation and categorical variables as frequency and percentage. Student performance assessment

Table 1. Student satisfaction evaluation at the end of the course program.

Survey Assessment Questions	Mean ± SD
Achieving course program objectives	
Education program objectives were announced.	4.05 ± 1.24
The content of the courses was aligned with the objectives.	4.14 ± 1.28
The course contents were understandable.	4.14 ± 1.28
The duration of the course program was sufficient to achieve educational objectives.	3.90 ± 1.26
Educational methods	
Educational methods were in line with the educational objectives.	4.14 ± 1.15
The materials prepared for theoretical classes were sufficient.	3.86 ± 1.46
The methods used in small group sessions (standardised patients, etc.) were appropriate.	4.38 ± 1.20
Scope of education	
The topics and content were suitable for my needs.	4.29 ± 1.19
The information I acquired could be used in clinical practice.	4.43 ± 1.21
The program duration was sufficient for the content.	4.24 ± 1.22
The courses were conducted in accordance with the course program.	4.24 ± 1.22
Duration and management of courses	
The session durations of theoretical classes were sufficient.	4.19 ± 1.17
The session durations of small group sessions were sufficient.	4.10 ± 1.30
The courses started and ended on time.	4.19 ± 1.21
The course content was suitable for the methods (theoretical/small group).	4.19 ± 1.29
Evaluation of instructors	
The instructor was knowledgeable in their field.	4.43 ± 1.21
The presentations in theoretical classes were sufficient.	4.05 ± 1.43
Small group sessions were adequately organised.	4.38 ± 1.20
The instructor was able to communicate effectively with students.	4.48 ± 1.21
Active participation of students in small group sessions was ensured.	4.38 ± 1.20
The instructor provided satisfactory answers to the questions asked.	4.43 ± 1.21
Satisfaction	
The course program was organised to enhance my professional knowledge and skills.	4.33 ± 1.21
I believe that the training I participated in contributed to my overall development.	4.43 ± 1.21
I intend to apply what I have learned throughout my professional career.	4.43 ± 1.21

scores were compared between the intervention group and the control group using an independent samples *t*-test, and pre-test and post-test scores for the intervention group were compared using a paired samples *t*-test for dependent groups. Statistical analysis for quantitative data was conducted using IBM SPSS 20.0 (IBM Corp., Armonk, NY, USA) software package. In evaluations, $p < 0.05$ was considered statistically significant. Effect sizes were calculated using a free online tool (https://lbecker.uccs.edu/).

Results

Participant characteristics

From a total of approximately 250 third-year medical students, 29 volunteered to participate in the intervention group, representing about 11.6% of the year group. Two participants were excluded from the study later due to absenteeism. The participants consisted of Gazi University Faculty of Medicine third-year students who had not repeated a year previously. Of the participants, 17 (62.96%) were male and 10 (37.04%) were female. The mean age was 20.28 ± 0.75 years. The control group consisted of 29 fourth-year students, of whom 14 (48.28%) were male and 15 (51.72%) were female. The mean age in the control group was 21.34 ± 0.86 years. There was no statistically significant difference between the intervention and control groups in terms of gender distribution ($p = 0.29$, chi-square test) or age ($p = 0.08$, independent samples *t*-test).

Satisfaction evaluation

A satisfaction survey was delivered to the 27 participants included in the training program. A total of 21 (77.78%) participants responded to the survey. The results of the satisfaction survey are presented in Table 1.

Participant assessment

Pre-test, post-test and control group evaluations were conducted using the evaluation form. The evaluation form was scored on a scale of 100 points. The pre-test results of the intervention group were calculated as 38.13 (95% CI: 31.84–53.66), post-test results were 88.33 (95% CI: 85.20–92.42), and control group results were 62.27 (95% CI: 52.84–68.14; Figure 2). The pre-test scores of the intervention group (pre-clinical students) were significantly lower than those of the post-test scores control group (clinical students; $p < 0.001$), and the post-test scores of the intervention group were significantly higher than those of the

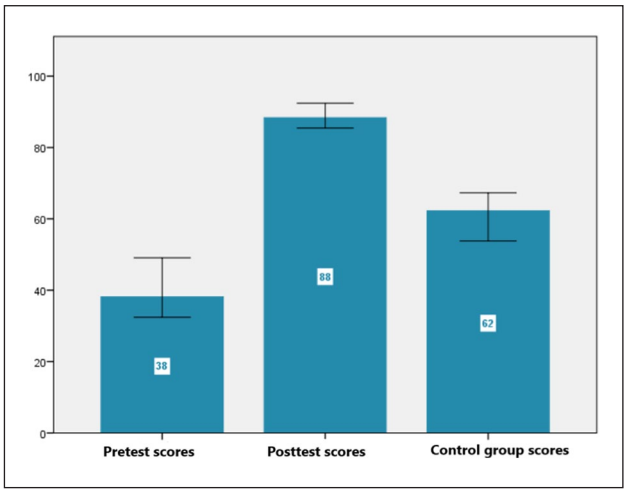


Figure 2. Pre-test post-test scores of the intervention group and post-test scores of the control group.

post-test scores control group ($p < 0.001$). Effect size was 0.81. Additionally, there was a statistically significant difference between pre-test and post-test scores for the intervention group ($p < 0.001$). Effect size was 0.92.

Discussion

Similar studies have been conducted in the literature with the aim of improving the quality of medical records for various reasons. Many of these studies have reported positive results (Kim and Spellberg, 2014; Ming et al., 2019; Myers et al., 2006; Nadeem et al., 2017). It is stated that in these studies, there was an increase in different parameters measured for each study, such as the quality, accuracy and timing of recording of clinical records. However, unlike these studies, a few studies have reported that the training program or intervention did not provide any positive contribution to the skills and abilities of the participants (Comeau and Craig, 2014; Davaridolatabadi et al., 2013; Sayyah-Melli et al., 2017). In our study, similar results to the literature were obtained, indicating that student satisfaction was positively affected by the training program, and there was a statistically significant difference in the clinical record-keeping scores due to the educational intervention. In our study, the scores of the control group (clinical year medical students), who received a routine training program, were significantly higher compared to the group that had not yet received training (pre-clinical students). However, after the intervention (our training program), the scores of the intervention group were significantly higher compared to the control group. It shows that pre-clinical students can outperform clinical year students in terms of clinical record-keeping skills if well-structured training is delivered before the clinical years. By doing so, they can benefit more from the clinical years because they are better prepared for these years. It is known that exposure to clinical skills early in medical education is crucial for acquiring and maintaining necessary competencies (Emekli et al., 2025). Previous studies have shown that providing structured clinical skills training – including record-keeping – prior to clinical exposure results in greater confidence, improved performance, and more efficient learning during the clinical phase (Kusnoor et al., 2022; Wagoner et al., 2022; Weber et al., 2022). Early introduction of such skills is associated with better integration into clinical workflows and enhanced educational outcomes for medical students. Therefore, it is important that this study targeted pre-clinical students and yielded positive outcomes in skill development. While our findings indicate that introducing record-keeping training prior to extensive clinical exposure can be advantageous in educational settings with phased curricula, we acknowledge that the applicability and timing of such interventions may differ in medical education systems with integrated or early clinical contact models. Enhancing record-keeping skills before clinical exposure for students who have not encountered patients can contribute significantly to both student education and the efficiency of healthcare systems.

In this study, students receiving the standard curriculum were included as the control group. Through the educational intervention, students were equipped with these skills before transitioning to the clinical phase. A statistically significant difference was observed between the scores of the control group and the post-test scores of the intervention group. When reviewing the literature, many studies lacked a control group (Axon et al., 2014; Lee et al., 2017; Liang and Shanker, 2017; Patel et al., 2018; Talwalkar et al., 2012; Tinsley, 2004). Considering that most of these studies are conducted in clinical settings, this could be viewed as a possible outcome. Even without formal training, residents or students often informally learn about medical record-keeping in clinical settings (Weber et al., 2022). This aspect might be overlooked in studies conducted with a single group in clinical environments. Therefore, when conducting studies, especially in populations where participants are already involved in medical record-keeping, this factor should be taken into account. The fact that this study was conducted during the pre-clinical phase and included a control group helps to demonstrate the effectiveness of the educational intervention more clearly.

For this study, the students' record-keeping scores were evaluated as criteria for program assessment. At this point, the program evaluation level of this study can be considered Kirkpatrick levels 1 and 2 (Kirkpatrick, 1996). Many studies in the literature also evaluate program outcomes at this level. However, only a few studies have assessed long-term effects (Momin et al., 2016; Olvet et al., 2022; Tinsley, 2004). In two of these studies, the effects of education were found to continue in the long term (Momin et al., 2016; Tinsley, 2004). Although neither study explicitly used the Kirkpatrick evaluation framework, the outcomes reported by Meidani et al. (2017) and Olvet et al. (2022) reflect changes (or the lack thereof) in learners' behaviour over time, which may be interpreted as corresponding to Kirkpatrick level 3 (behaviour; Emekli et al., 2025). In both cases, the initially observed improvements in documentation performance were not sustained in the long term, underlining the challenge of achieving durable behavioural change through educational interventions. A limitation of

our study was the inability to measure the long-term effects of our training program, which leads to uncertainty about whether the educational impact can be sustained.

QNOTE and PDQI-9 forms, which have been validated and shown reliability in the literature, were used as assessment tools in the study (Burke et al, 2014; Stetson et al., 2008). Different assessment forms have also been used in studies in the literature. In many studies, these assessment forms were developed by authors based on various guidelines (Cromwell et al., 2018; Loeb et al., 2010; Owen et al., 2015; Ryan et al., 2020), quality assessment scales (Bischoff et al., 2013; Nadeem et al., 2017) or clinical experience (Collard et al., 2014; Eichholz et al., 2004). Only one study had conducted a validity and reliability study on the form created (Olvet et al., 2022). This makes the evaluations of the studies subject to debate. Although validated forms were used as the basis for the evaluation form in this study, no separate validity and reliability study was conducted. In addition, no formal inter-rater reliability analysis (e.g. kappa or Intraclass Correlation Analysis) was performed for the assessment scores, which is a further limitation.

This study also has several other methodological limitations that should be acknowledged. First, a pre-test assessment was not performed for the control group, which limits the ability to evaluate within-group changes over time for this group. However, the primary purpose of the control group was not to assess their own learning progress, but rather to serve as a reference point for comparison with the intervention group, providing a benchmark for third-year students' performance after routine clinical exposure. Second, although all assessments were conducted by the same two faculty members for consistency, using only a small number of assessors may introduce subjective bias. Due to operational circumstances, we could not randomise the participants when assigning them to the groups, which is an important limitation of our study. Furthermore, the relatively small sample size limits the generalisability of our findings. It is also possible that, since the intervention group was voluntary to receive training on clinical record-keeping, their motivation could affect the outcomes.

Conclusion

The significant outcome of the study was the effectiveness of the educational program administered to students prior to substantial clinical exposure, as compared to students enrolled in the conventional program. Notably, this training was delivered to pre-clinical students who had not yet encountered patients, yielding positive results in terms of skill acquisition and preparedness. These findings highlight the potential benefits of introducing record-keeping education early in medical training. However, we recognise that the optimal timing and structure of such training may vary according to the organisation of different medical education systems. Integrating early patient clinical exposure alongside record-keeping education may further reinforce the development of essential competencies. Ultimately, adapting the timing and format of clinical record-keeping training to fit the specific context and curriculum structure may help maximise its impact on student learning and professional readiness.

Acknowledgements

The authors would like to express their sincere gratitude to Prof. Dr. Işıl İrem Budakoğlu (Department of Medical Education, Gazi University) for her valuable contributions throughout the development of this study. We also extend our thanks to Prof. Dr. Serdar Kula (Department of Paediatric Cardiology, Gazi University) for her insightful feedback and continuous support as a member of the thesis advisory committee.

Author contributions

Conceptualisation: Emre Emekli, Özlem Coşkun; Methodology: Emre Emekli, Özlem Coşkun, Vildan Özeke, Formal analysis and investigation: Emre Emekli, Yavuz Selim Kıyak; Writing – original draft preparation: Emre Emekli, Özlem Coşkun; Writing – review and editing: Vildan Özeke, Yavuz Selim Kıyak; Funding acquisition: Emre Emekli, Özlem Coşkun; Resources: Emre Emekli, Özlem Coşkun, Yavuz Selim Kıyak; Supervision: Özlem Coşkun, Yavuz Selim Kıyak.

Data availability

Data will be madeavailable upon reasonable request.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship and/or publication of this article: This study was conducted to contribute to the PhD Thesis of Emre Emekli, Gazi University Projects of Scientific Investigation (BAP) supported the study (Project No: TDK-2023-8588).

ORCID iDs

Emre Emekli, MD, PhD https://orcid.org/0000-0001-5989-1897
Vildan Özeke, PhD https://orcid.org/0000-0003-1827-1258
Yavuz Selim Kıyak, MD, PhD https://orcid.org/0000-0002-5026-3234

References

Association of American Medical Colleges (2014) The Core Entrustable Professional Activities (EPAs) for Entering Residency. Available at: https://www.aamc.org/about-us/mission-areas/medical-education/cbme/core-epas (accessed 2 January 2024).

Axon RN, Penney FT, Kyle TR, et al. (2014) A hospital discharge summary quality improvement program featuring individual and team-based feedback and academic detailing. *American Journal of the Medical Sciences* 347(6): 472–477.

Bischoff K, Goel A, Hollander H, et al. (2013) The Housestaff Incentive Program: Improving the timeliness and quality of discharge summaries by engaging residents in quality improvement *BMJ Quality & Safety* 22(9): 768–774.

Burke HB, Hoang A, Becher D, et al. (2014) QNOTE: An instrument for measuring the quality of EHR clinical notes.

Journal of the American Medical Informatics Association 21(5): 910–916.

Collard MD, Tellier J, Chowdhury AS, et al. (2014) Improvement in reporting skills of radiology residents with a structured reporting curriculum. *Academic Radiology* 21(1): 126–133.

Comeau R and Craig C (2014) Does teaching of documentation of shoulder dystocia delivery through simulation result in improved documentation in real life? *Journal of Obstetrics and Gynaecology Canada* 36(3): 258–265.

Cromwell PM, Flood M, O Connell E, et al. (2018) POST-OP: A strategy to improve clinical documentation in the early postoperative period. *Journal of Surgical Education* 75(4): 957–963.

Davaridolatabadi N, Sadoughi F, Meidani Z, et al. (2013) The effect of educational intervention on medical diagnosis recording among residents. *Acta Informatica Medica* 21(3): 173–175.

Eichholz AC, Van Voorhis BJ, Sorosky JI, et al. (2004) Operative note dictation: Should it be taught routinely in residency programs? *Obstetrics & Gynecology* 103(2): 342–346.

Emekli E, Coşkun Ö, Budakoğlu Iİ, et al (2023) Clinical record keeping education needs in a medical school and the quality of clinical documentations. *Konuralp Medical Journal* 16(2): 154–160.

Emekli E, Coşkun Ö and Budakoğlu Iİ (2025) Medical record-keeping educational interventions for medical students and residents: A systematic review. *Health Information Management Journal* 54(2): 177–189.

Emekli E and Kıyak YS (2024) Comprehensiveness and Instructional Quality of YouTube Videos on Clinical Record-Keeping Training in Medical Education. *Konuralp Medical Journal* 16(2): 154–160.

Finn KM, Roy CL and Katz JT (2007) Improving the quality of intern documentation through structured feedback. *Medical Education* 41(11): 1101–1102

Gliatto P, Masters P and Karani R (2009) Medical student documentation in the medical record: Is it a liability? *Mount Sinai Journal of Medicine* 76(4): 357–364.

Glisson JK, Morton ME, Bond AH, et al. (2011) Does an education intervention improve physician signature legibility? Pilot study of a prospective chart review. *Perspectives in Health Information Management* 8: 1e.

Haghighi MH, Dehghani M, Teshnizi SH, et al. (2014) Impact of documentation errors on accuracy of cause of death coding in an educational hospital in Southern Iran. *Health Information Management Journal* 43(2): 35–42.

Jackson T (2014) Data quality: Not selling ourselves short. *Health Information Management Journal* 43(2): 4–6.

Kim D and Spellberg B (2014) Does real-time feedback to residents with or without attendings improve medical documentation? *Hospital Practice* 42(3): 123–130.

Kirkpatrick DL (1996) Great ideas revisited. Techniques for evaluating training programs. Revisiting Kirkpatrick's four-level model. *Training & Development* 50(1): 54–59.

Kuhn T, Basch P, Barr M, et al. (2015) Clinical documentation in the 21st century: Executive summary of a policy position paper from the American College of Physicians. *Annals of Internal Medicine* 162(4): 301–303.

Kusnoor AV, Balchandani R, Pillow MT, et al. (2022) Near-peers effectively teach clinical documentation skills to early medical students. *BMC Medical Education* 22(1): 712.

Lee EL, Chisty A, Williams P, et al. (2017) An innovative curriculum using a simulated electronic health record to teach internal medicine residents about ICD-10-CM. *MedEdPORTAL* 13: 10538.

Liaison Committee on Medical Education (2023) Functions and Structure of a Medical School. Available at: https://lcme.org/publications (2 January 2024).

Liang JW and Shanker VL (2017) Education in neurology resident documentation using payroll simulation. *Journal of Graduate Medical Education* 9(2): 231–236.

Loeb DF, Aagaard EM, Cali SR, et al. (2010) Modest impact of a brief curricular intervention on poor documentation of sexual history in university-based resident internal medicine clinics. *Journal of Sexual Medicine* 7(10): 3315–3321.

Mamykina L, Vawdrey DK, Stetson PD, et al. (2012) Clinical documentation: composition or synthesis? *Journal of the American Medical Informatics Association* 19(6): 1025–1031.

McLean A, Lawlor J, Mitchell R, et al. (2015) Impact of a structured intern education programme on clinical documentation in the emergency department. *Emergency Medicine Australasia* 27(1): 29–34.

Medical School Objectives Writing Group (1999) Learning objectives for medical student education guidelines for medical schools: report I of the Medical School Objectives Project. *Academic Medicine* 74(1): 13–18.

Meidani Z, Farzandipour M, Davoodabadi A, et al. (2017) Effect of reinforced audit and feedback intervention on physician behaviour: A multifaceted strategy for targeting medical record documentation. *The Journal of the Royal College of Physicians of Edinburgh* 47(3): 237–242.

Ming D, Zietlow K, Song Y, et al. (2019) Discharge summary training curriculum: A novel approach to training medical students how to write effective discharge summaries. *Clinical Teacher* 16(5): 507–512.

Momin SR, Lorenz RR and Lamarre ED (2016) Effect of a documentation improvement program for an academic otolaryngology practice. *JAMA Otolaryngology – Head & Neck Surgery* 142(6): 533–537.

Myers JS, Jaipaul CK, Kogan JR, et al. (2006) Are discharge summaries teachable? The effects of a discharge summary curriculum on the quality of discharge summaries in an internal medicine residency program. *Academic Medicine* 81: 5–8.

Nadeem N, Zafar AM, Haider S, et al. (2017) Chart-stimulated recall as a learning tool for improving radiology residents' reports. *Academic Radiology* 24(8): 1023–1026.

Olvet DM, Wackett A, Crichlow S, et al. (2022) Analysis of a near peer tutoring program to improve medical students' note writing skills. *Teaching and Learning in Medicine* 34(4): 425–433.

Owen J, Conway R, Silke B, et al. (2015) Medical record documentation among interns: A prospective quality improvement study. *Irish Medical Journal* 108(6): 183–185.

Patel A, Ali A, Lutfi F, et al. (2018) An interactive multimodality curriculum teaching medicine residents about oncologic documentation and billing. *MedEdPORTAL* 14: 10746.

Rowlands S, Coverdale S and Callen J (2016) Documentation of clinical care in hospital patients' medical records: A qualitative study of medical students' perspectives on clinical documentation education. *Health Information Management Journal* 45(3): 99–106.

Ryan JM, Geraghty K, Khan W, et al. (2020) The DATA protocol: Developing an educational tool to optimise note-writing in hospitals. *Irish Journal of Medical Science* 189(3): 10271031.

Sayyah-Melli M, Nikravan Mofrad M, Amini A, et al. (2017) The effect of medical recording training on quantity and quality of recording in gynecology residents of Tabriz University of Medical Sciences. *Journal of Caring Science* 6(3): 281–292.

Seo JH, Kong HH, Im SJ, et al. (2016) A pilot study on the evaluation of medical student documentation: Assessment of SOAP notes. *Korean Journal of Medical Education* 28(2): 237–241.

Smith J, Carlos WG, Johnson CS, et al. (2018) A pilot study: A teaching electronic medical record for educating and assessing residents in the care of patients. *Medical Education Online* 23(1): 1447211.

Stetson PD, Morrison FP, Bakken S, et al. (2008) eNote Research Team. Preliminary development of the physician documentation quality instrument. *Journal of the American Medical Informatics Association* 15(4): 534–541.

Talwalkar JS, Ouellette JR, Alston S, et al. (2012) A structured workshop to improve the quality of resident discharge summaries. *Journal of Graduate Medical Education* 4(1): 87–91.

Thomas PA, Kern DE, Hughes MT, et al. (2022) *Curriculum Development for Medical Education: A Six-Step Approach*. 4th edn. Baltimore, MD: Johns Hopkins University Press.

Tinsley JA (2004) An educational intervention to improve residents' inpatient charting. *Academic Psychiatry* 28(2): 136139.

Vahedi HS, Mirfakhrai M, Vahidi E, et al. (2018) Impact of an educational intervention on medical records documentation. *World Journal of Emergency Medicine* 9(2): 136–140.

Wagner E, McCord G, Stockton L, et al. (2006) A sexual history taking curriculum for second year medical students. *Medical Teacher* 28(2): 184–186.

Wagoner K, Meglin M, Dempsey A, et al. (2022) Improving feedback students receive on documentation during the obstetrics and gynecology clerkship. *AJOG Global Reports* 2(4): 100117.

Weber DE, Held JD, Jandarov RA, et al. (2022) Improving trainee clinical documentation through a novel curriculum in internal medicine. *Journal of Hospital Medicine* 17(1): 28–35.

Yılmaz BK, Topcu H and Acar YA (2017) Acil hekimlik perspektifinden hekimlerin hukuki yükümlülüklerinin değerlendirilmesi. *Şişli Etfal Hastanesi Tıp Bülteni* 51(2): 142.

Yu MX, Jiang XY, Li YJ, et al. (2018) Evaluation of medical record quality and communication skills among pediatric interns after standardized parent training history-taking in China. *Medical Teacher* 40(2): 188–192.

Appendix. Clinical record-keeping evaluation form.

Evaluation Items	Fully (100)	Partially (50)	Unacceptable (0)
1. Chief complaint(s)			
A. Sufficient information (*enough information to direct HPI; includes pertinent details; includes duration*)			
2. HPI			
A. Sufficient information (*enough information for purpose*)			
B. Concise (*focused, brief, not redundant*)			
C. Clear (*understandable for everyone*)			
D. Organised (*properly grouped, chronological*)			
3. Problem (list)			
A. Current (*up-to-date*)			
B. Ordered (*from most to least important*)			
C. Concise (*focused, brief, not redundant*)			
D. Complete (*addresses all important problems*)			
4. Past medical history			
A. Complete (*addresses all important problems*)			
B. Concise (*focused, brief, not redundant*)			
C. Clear (*understandable for everyone*)			
D. Organised (*properly grouped, chronological*)			
5. Medications (list)			
A. Current (*up-to-date)*			
B. Complete (*contains all the current medications*)			
C. Concise (*no non-current medications*)			
6. Adverse drug reactions and allergies			
A. Current (*up-to-date*)			
B. Sufficient information (*enough information for purpose*)			
C. Clear (*understandable for everyone*)			
7. Social and family history			
A. Current (*up-to-date*)			
B. Sufficient information (*enough information for purpose*)			
C. Clear (*understandable for everyone*)			
D. Concise (*focused, brief, not redundant*)			
E. Organised (*properly grouped, chronological*)			

(Continued)

Appendix (Continued)

Evaluation Items	Fully (100)	Partially (50)	Unacceptable (0)
8. Review of systems			
A. Complete (*addresses all positives*)			
B. Clear (*understandable for everyone*)			
C. Concise (*focused, brief, not redundant*)			
9. Physical findings			
A. Complete (*addresses all positives*)			
B. Clear (*understandable for everyone*)			
C. Concise (*focused, brief, not redundant*)			
10. Assesment (*differantial diagnosis*), plan of care, follow-up information			
A. Prioritised (*displayed in order of importance*)			
B. Sufficient information (*enough information for purpose*)			
C. Clear (*understandable for everyone*)			
D. Concise (*focused, brief, not redundant*)			

11. Consultation note	5 (100)	4 (75)	3 (50)	2 (25)	1 (0)
A. Up-to-date					
B. Accurate					
C. Thorough					
D. Useful					
E. Organised					
F. Comprehensible					
G. Succint					
H. Synthesised					
I. Internally consistent					

HPI: history of present illness.