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Improving Operative Note Documentation Through a Two-Cycle Clinical Audit at Sinnar Teaching Hospital, Sudan

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Abstract

Introduction

Operative notes are essential medical and medico-legal documents that support patient safety, postoperative management, and communication among healthcare professionals. However, compliance with recommended documentation standards frequently remains suboptimal. This study aimed to assess operative note documentation at Sinnar Teaching Hospital, Sinnar, Sudan, according to Royal College of Surgeons (RCS) guidelines and evaluate the impact of an educational intervention using a two-cycle closed-loop clinical audit.

Methods

A prospective, two-cycle clinical audit using total-coverage sampling was conducted in the Department of Surgery at Sinnar Teaching Hospital. A total of 500 operative notes were reviewed, including 250 notes in each audit cycle. The baseline audit was conducted between November and December 2022, followed by an educational intervention, while the re-audit was performed between July and August 2023. Data were collected using a structured checklist based on RCS guidelines. Evaluated parameters included administrative details, operative findings, technical surgical documentation, and perioperative safety measures. Descriptive statistics were used, and results were expressed as percentages.

Results

Overall compliance with RCS standards improved substantially from 43.8% in the baseline audit to 82.3% in the re-audit cycle. Major improvements were observed in administrative documentation, including recording of time (2% to 88%), date (14% to 97%), and elective versus emergency classification (0% to 96%). Documentation of surgical team members reached 100% compliance in the re-audit cycle. Technical operative documentation also improved, including operative procedure (40% to 84%), operative diagnosis (50% to 86%), and operative findings (74% to 90%). Safety-related documentation demonstrated improvement, with anticipated blood loss increasing from 8% to 72%, antibiotic prophylaxis from 0% to 50%, and deep vein thrombosis prophylaxis from 0% to 36%. Postoperative care instructions remained consistently high throughout both cycles (94% to 96%).

Conclusion

Operative note documentation at Sinnar Teaching Hospital was initially below recommended standards but improved markedly following an educational intervention. This study demonstrates that documentation quality is a modifiable aspect of surgical practice and can be significantly enhanced through structured audit-feedback and educational strategies, even in resource-limited settings. Ongoing re-audits, continuous professional education, and implementation of standardized documentation systems are recommended to sustain improvements and optimize patient safety and quality of surgical care.

Categories: General Surgery, Medical Education, Quality Improvement
Keywords: clinical audit, operative notes, patient safety, quality improvement, rcs guidelines, sudan, surgical documentation

Introduction

The operative note is a vital medical and medico-legal document that provides a detailed and contemporaneous record of a surgical procedure. Accurate and comprehensive documentation of intraoperative findings, surgical techniques, and postoperative plans is essential to ensure patient safety, guide postoperative management, and facilitate effective communication among healthcare professionals [1,2]. In addition, within an increasingly litigious medical environment, high-quality operative documentation constitutes an important legal safeguard for surgeons in the event of medico-legal disputes

[3].

Despite its recognized clinical importance, several studies worldwide have demonstrated that operative note documentation frequently falls below accepted standards, with critical information often omitted or inadequately recorded [2,4]. In response to these deficiencies, the Royal College of Surgeons (RCS) of England has developed clear, evidence-based guidelines that define the minimum required components of operative notes [1]. Adherence to these guidelines represents not only professional best practice but also a fundamental element of surgical governance and quality improvement. Sustained improvement in operative note documentation requires not only the introduction of a standardized form but also continued staff education, consistent implementation, and periodic re-auditing to identify gaps and maintain compliance with established standards.

In Sudan, particularly in resource-limited settings such as Sinnar Teaching Hospital, operative documentation remains predominantly handwritten and paper-based, presenting additional challenges related to legibility, completeness, and standardization. Regular evaluation of documentation practices is therefore necessary to identify gaps, promote adherence to international standards, and enhance the overall quality of surgical care. Consequently, this clinical audit was conducted to assess the level of compliance of operative notes in the Department of Surgery at Sinnar Teaching Hospital, Sinnar, Sudan, with the RCS guidelines and to evaluate the effectiveness of an educational intervention through a two-cycle audit process by assessing changes in compliance following a multimodal quality improvement intervention comprising the introduction of a standardized operative note proforma and structured staff training. The audit assessed documentation across administrative, technical, and postoperative safety domains over two audit cycles.

Materials And Methods

Study design and setting

A prospective, two-cycle clinical audit using total coverage sampling was conducted at the Department of Surgery, Sinnar Teaching Hospital. The audit included all surgical units within the hospital. It was carried out in two cycles to assess the quality of operative note documentation and to evaluate the impact of an intervention. The first cycle (baseline audit) was conducted from November 21, 2022, to December 21, 2022. Following this, an intervention phase was implemented, which consisted of two targeted training workshops, delivered during the routine clinical surgical meetings, focusing on the application of RCS guidelines to improve operative note documentation. The sessions were directed at all surgical staff levels, including house officers, medical officers, specialty registrars, specialists, and consultants. Additionally, a new standardized operation note proforma strictly adhering to the RCS guidelines was introduced (Appendices). The implementation process involved introducing the form to the relevant surgical team and making it available for routine use in the operating theatre for both elective and emergent procedures. Subsequently, a second cycle (re-audit) was conducted from July 21, 2023, to August 21, 2023, to evaluate compliance improvements.

Study population and sampling

A total of 500 operative notes were reviewed, with 250 operative notes included in each audit cycle. A total coverage sampling method was employed to include all eligible operative notes generated during the specified study periods. The audit included operative notes for surgical procedures performed in the main operating theatres of the General Surgery, Orthopedics, Urology, and Ear, Nose, and Throat (ENT) departments during the defined audit periods. Minor bedside procedures performed outside the main operating theatres, such as wound debridement under local anaesthesia in the ward, were excluded.

Data collection and audit standards

Data were manually extracted from paper-based patient records and operative notes. Data collection was carried out by the principal investigator, assisted by a trained team familiar with the study protocol, to ensure consistency and accuracy. Uninterpretable documentation was considered incomplete for the corresponding parameter. The parameters assessed included: date and time of surgery; elective or emergency classification; procedure name; names of the operating surgeon and assistant; name of the anesthetist; type of incision; operative diagnosis; intraoperative findings; complications or problems encountered; details and justification of any additional procedures performed; details of tissue removed, added, or altered; closure technique; estimated blood loss; antibiotic prophylaxis; deep vein thrombosis (DVT) prophylaxis; postoperative care instructions; and the surgeon's signature.

The audit standards were based on the RCS of England guidelines for good surgical practice [1]. A structured data collection checklist was developed in accordance with these guidelines to ensure standardized data capture. Broadly comparable types of surgical procedures were assessed across both audit cycles, using the same predefined documentation criteria derived from the RCS guidelines.

Ethical considerations

The Sinnar Teaching Hospital Administration approved the study on October 15, 2022. Patient confidentiality and data privacy were maintained throughout the study. Unique identification codes were used instead of patient names during data extraction and analysis to protect patient confidentiality.

Statistical analysis

Data were entered and organized using Microsoft Excel (Microsoft Corporation, Redmond, Washington, United States). Descriptive statistics were used to summarize the findings. Results were presented as frequencies and percentages to compare compliance with the RCS guidelines between the first and second audit cycles. IBM SPSS Statistics for Windows, version 25 (IBM Corp., Armonk, New York, United States), and R programming (R Foundation for Statistical Computing, Vienna, Austria) were used for descriptive analysis.

Results

Study population and audit volume

A total coverage clinical audit was conducted, reviewing 500 operative notes (Table *1*). The audit was performed in two cycles: the baseline audit (Cycle 1, n = 250) and the post-intervention re-audit (Cycle 2, n = 250). The operative notes represented a wide range of surgical procedures across multiple units, including general surgery, orthopedics, and emergency trauma cases. Overall compliance with the RCS standards increased substantially, from 43.8% in the first cycle to 82.3% in the second cycle, suggesting an improvement of 38.5% in compliance following the educational intervention.

Parameter Assessed	Baseline (cycle 1)	Re-audit (cycle 2)	Improvement
Date	(35) 14%	(242) 97%	83%
Time	(5) 2%	(220) 88%	86%
Elective/emergency procedure	(0) 0%	(240) 96%	96%
Name of the surgeon and assistant	(230) 92%	(250) 100%	8%
Name of anesthetist	(215) 86%	(250) 100%	14%
Name of procedure	(100) 40%	(210) 84%	44%
Type of incision	(180) 72%	(250) 100%	28%
Operative diagnosis	(125) 50%	(215) 86%	36%
Operative findings	(185) 74%	(225) 90%	16%
Complication encountered	(165) 66%	(210) 84%	18%
Extra procedure performed with reason	(40) 16%	(175) 70%	54%
Detail of tissue removed, added, or altered	(185) 74%	(190) 76%	2%
Closure technique	(105) 42%	(195) 78%	36%
Anticipated blood loss	(20) 8%	(180) 72%	64%
Antibiotic prophylaxis	(0) 0%	(125) 50%	50%
DVT prophylaxis	(0) 0%	(90) 36%	36%
Postoperative care instructions	(235) 94%	(240) 96%	2%
Signature	(150) 60%	(200) 80%	20%

TABLE 1: Comparison of operative note documentation between cycle 1 and cycle 2, including documentation rates and percentage improvement (N=250)

DVT: deep vein thrombosis

Administrative and team identification documentation

At baseline (cycle 1), documentation of administrative parameters was limited. The time of surgery was recorded in only 2% of operative notes, while the date of surgery was documented in 14%. Identification of

the surgical team, including the operating surgeon, assistant, and anesthetist, showed higher compliance at baseline (86-92%). Documentation of elective versus emergency classification was absent (0%) initially.

Following the educational intervention (cycle 2), significant improvements were observed. Time and date documentation increased to 88% and 97%, respectively. Identification of all team members reached 100%, and elective/emergency classification rose to 96%, ensuring clear clinical context for each procedure.

Surgical technique and intraoperative findings

Compliance with documenting operative details showed notable enhancements. The operative procedure was recorded in 40% of notes at baseline, improving to 84% post intervention. Documentation of operative findings increased from 74% to 90% while documentation of the diagnosis rose from 50% to 86%. The type of incision was documented in all operative notes during the re-audit. Furthermore, documentation of any extra procedures and the corresponding rationale improved from 16% at baseline to 70%, while recording of any intraoperative problems or complications improved from 66% to 84%. Documentation of tissue removed, added, or altered remained consistent across both cycles (74% to 76%). Recording of closure technique improved from 42% to 78%, reflecting adherence to RCS standards.

Safety measures and postoperative instructions

Documentation of perioperative safety parameters improved substantially. Anticipated blood loss was documented in only 8% of cases at baseline, rising to 72% after the intervention. Antibiotic prophylaxis and DVT prophylaxis documentation, which were initially absent, improved to 50% and 36%, respectively. Compliance with postoperative instructions remained high, increasing slightly from 94% to 96%. The presence of the surgeon's signature increased from 60% to 80%, confirming authentication and accountability of operative notes.

Discussion

This clinical audit demonstrated a marked improvement in the quality of operative note documentation following a structured quality improvement intervention. As part of the quality improvement intervention, a new structured operative note form was developed based on the RCS-recommended documentation standards [1], accompanied by a targeted training session to promote standardized and comprehensive documentation (Appendices). Overall compliance with RCS standards increased from 43.8% in the baseline audit to 82.3% in the re-audit. This represents an absolute improvement of 38.5 percentage points, reflecting a substantial enhancement in adherence to recommended documentation standards. Several individual parameters demonstrated particularly dramatic gains, most notably documentation of procedure classification as elective or emergency and recording of the time of surgery. These findings emphasize that documentation quality is a modifiable component of surgical practice and can be significantly improved through structured quality improvement interventions.

Baseline findings revealed considerable deficiencies in essential documentation domains, particularly administrative and perioperative safety elements. Critical information such as time of surgery, anticipated blood loss, and procedure classification was either poorly documented or entirely absent. Baseline compliance in this audit (43.8%) was consistent with the substantial documentation deficiencies reported in previous audits of operative notes [2-4]. This suggests that incomplete operative documentation is a widespread challenge that extends beyond resource-limited settings and may be influenced by broader systemic factors such as workload pressures, time constraints, and lack of standardized documentation templates.

Following the intervention, substantial improvements were observed across most documentation parameters, particularly those related to administrative details and technical operative documentation. Recording of the date, time, and surgical team members approached complete compliance in the re-audit cycle. These improvements suggest that increasing clinician awareness regarding medico-legal responsibilities, reinforcing RCS standards, and providing practical clarification of documentation expectations may positively influence professional behavior. Similar findings have been reported in previous studies in which audit-feedback strategies and educational interventions resulted in improvements in documentation quality [3,5,6]. Collectively, these findings support the effectiveness of structured quality improvement interventions that address behavioral and knowledge-related gaps in clinical practice.

Marked improvements were also observed in documentation of operative diagnosis, operative findings, incision type, and closure technique. Accurate recording of these technical details is essential for continuity of postoperative care, multidisciplinary communication, and future clinical decision-making. In addition, comprehensive operative documentation serves as an important medico-legal record, particularly where handwritten documentation remains an important component of the medical record [1,3,7].

Despite the overall progress achieved, safety-related documentation remained relatively suboptimal. Although documentation of antibiotic prophylaxis and DVT prophylaxis improved from 0% to 50% and 36%, respectively, these parameters remained among the lowest-performing indicators in the re-audit cycle,

reflecting their dependence on clinical indications and individual decision-making. Although documentation should indicate whether prophylaxis was administered or withheld, including the reasons for withholding it, clinicians may overlook documenting these decisions. Potential limitations in medication availability may also have contributed, although this was not specifically assessed in the audit. This may reflect a tendency to prioritize procedural and technical aspects of surgery over perioperative preventive measures during documentation. Incomplete recording of perioperative interventions may compromise the completeness of the clinical record and affect patient safety, postoperative management, and continuity of care [1,7,8]. These findings highlight the need for additional targeted interventions focusing specifically on perioperative safety documentation.

Interestingly, documentation of tissue removed, added, or altered demonstrated minimal change between audit cycles, suggesting that this parameter had already been integrated into routine surgical documentation practices prior to the intervention. Similarly, documentation of postoperative care instructions maintained consistently high compliance throughout both audit cycles, reflecting an established culture of documenting immediate postoperative management plans.

From a clinical governance perspective, improvements in operative note documentation have important implications for patient safety and healthcare quality. High-quality documentation supports continuity of care, enhances multidisciplinary communication, and reduces the likelihood of errors in postoperative management. Furthermore, operative notes constitute an important medico-legal record, and adherence to recognized documentation standards strengthens professional accountability and supports the quality of clinical records [1,3,7]. Aligning local documentation practices with internationally recognized RCS standards therefore represents an important component of clinical governance and quality assurance [1,4].

A major strength of this audit is the inclusion of total coverage sampling involving 500 operative notes together with the use of a closed-loop audit design. Compared with single-cycle audits, a closed-loop audit provides an opportunity to identify deficiencies, implement targeted corrective measures, and assess subsequent changes in practice. The observed improvement is consistent with evidence supporting the role of audit and feedback in improving professional practice [6]. Additionally, the study demonstrates that meaningful improvements in documentation standards are achievable even in paper-based, resource-limited healthcare settings through relatively low-cost educational strategies.

This study has several limitations. First, as a single-center audit, generalizability to institutions with different resources or clinical practices may be limited. Second, the relatively short interval between the audit cycles evaluates short-term compliance rather than long-term sustainability. Third, the study assessed documentation completeness rather than actual clinical accuracy of the documented clinical practices, and findings may partly reflect the Hawthorne effect, where clinicians modify their behavior due to the awareness of being evaluated. As data collection was performed manually, there is also a potential risk of observer bias despite efforts to standardize data extraction. Furthermore, although a trained team used the same RCS-based checklist across both cycles, inter-rater reliability was not formally assessed. Changes in surgical personnel between cycles and other potential confounding factors could not be fully controlled. Finally, the descriptive analysis did not include inferential statistical testing; therefore, the observed changes should not be interpreted as statistically significant differences.

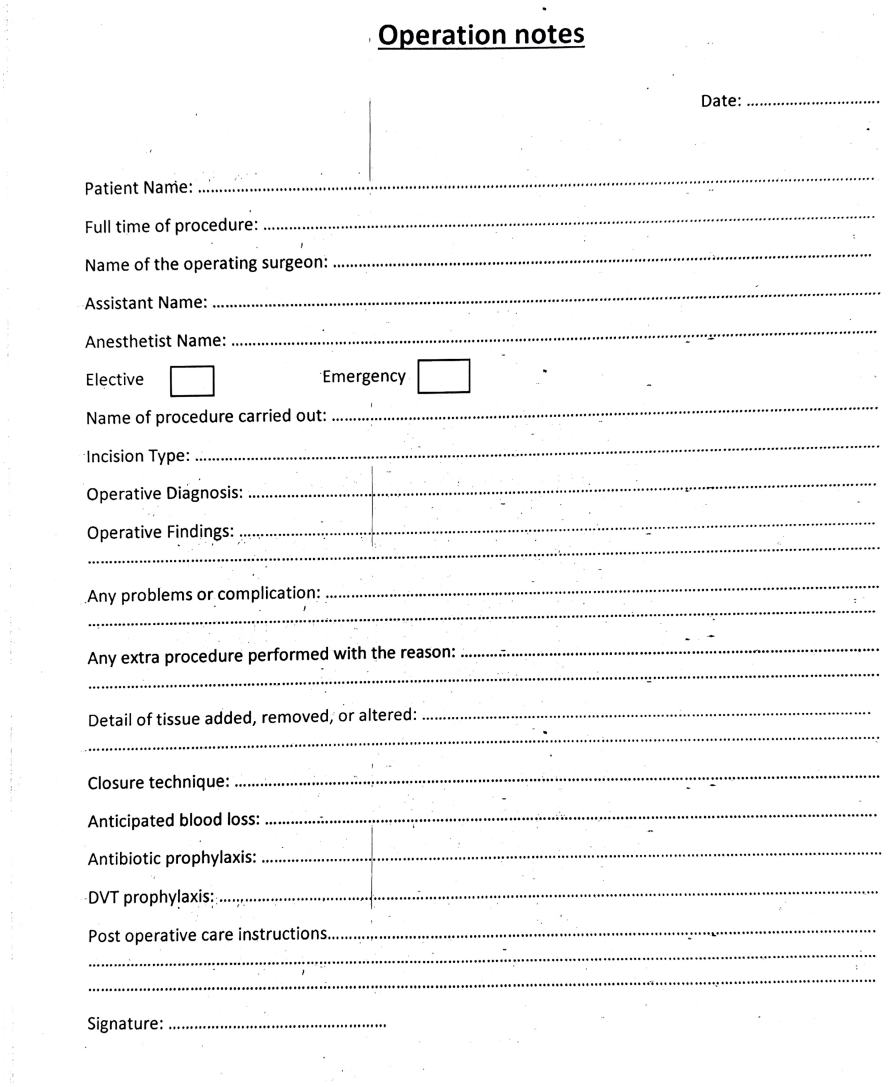
Despite these limitations, this audit demonstrates that structured educational interventions combined with audit-feedback mechanisms can produce substantial improvements in operative note quality, ultimately contributing to safer surgical care and stronger medico-legal protection.

Sustaining these improvements remains an important challenge. Documentation quality may decline over time without continuous reinforcement, particularly given the periodic rotation of the surgical staff. Future efforts should focus on regular re-audits, integration of documentation training into surgical orientation and continuing professional education programs, and adoption of structured or electronic operative note templates to further standardize documentation. Previous research has demonstrated that electronic operative note systems can improve the completeness, timeliness, and compliance of operative documentation [7,9].

Conclusions

This clinical audit demonstrated that operative note documentation at Sinnar Teaching Hospital was initially below the standards recommended by the RCS. Following a structured educational intervention and audit-feedback mechanism, overall compliance improved substantially. These findings demonstrate that targeted education and closed-loop clinical audit can improve operative note documentation, although continued re-auditing and reinforcement are needed to sustain these improvements.

Appendices


Operation notes

Date: .....

Patient Name: .....

Full time of procedure: .....

Name of the operating surgeon: .....

Assistant Name: .....

Anesthetist Name: .....

Elective ☐ Emergency ☐

Name of procedure carried out: .....

Incision Type: .....

Operative Diagnosis: .....

Operative Findings: .....

.....

Any problems or complication: .....

.....

Any extra procedure performed with the reason: .....

.....

Detail of tissue added, removed, or altered: .....

.....

Closure technique: .....

Anticipated blood loss: .....

Antibiotic prophylaxis: .....

DVT prophylaxis: .....

Post operative care instructions.....

.....

.....

Signature: .....

FIGURE 1: Operation note documentation sheet used as part of the intervention

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Ali M. Eltayeb, Omer Khalid, Ahmed Bakhat, Imad Eldeen O. Ahmed

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Sinnar Teaching Hospital Administration issued approval dated October 15, 2022.
Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.
Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the

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