Cureus
Part of SPRINGER NATURE

Open Access Original Article

Operative Note Documentation for Laparoscopic Cholecystectomy Against Getting It Right First Time (GIRFT) Standards: A Closed-Loop Audit

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Review began 10/29/2026
Review ended 11/18/2026
Published 11/24/2026

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DOI: 10.7759/cureus.120170

Abstract

Background: Operative notes are essential medico-legal documents that communicate intraoperative findings, procedural details, and postoperative management. High-quality documentation is critical for patient safety, continuity of care, and medico-legal protection and is emphasised by national standards, including Getting It Right First Time (GIRFT) and the Royal College of Surgeons.

Aim: To assess compliance of laparoscopic cholecystectomy operative note documentation with the GIRFT Best Practice Laparoscopic Cholecystectomy Guidelines (2022) and improve documentation practices through a combined quality-improvement intervention involving revision of the standardised operative note template and dissemination of initial audit findings to the surgical team.

Methods: A closed-loop retrospective audit was conducted at an NHS tertiary hospital in England. Operative notes for laparoscopic cholecystectomies were assessed against 16 selected GIRFT documentation criteria. Following the initial audit cycle, the existing operative note template was revised to incorporate 14 of the 16 audit criteria, and the initial audit findings were disseminated to the surgical team through departmental presentations, emails, and an educational poster. A second audit cycle was conducted one month after implementation to assess changes in documentation quality. Compliance rates were compared between cycles using Fisher's exact test, with p-values adjusted for multiple comparisons using the Holm method. Overall documentation scores were compared using the Mann-Whitney U test.

Results: A total of 97 laparoscopic cholecystectomy operative notes were reviewed in the first audit cycle and 31 in the second. Documentation improved across most criteria between cycles. The largest improvements were observed in abdominal washout volume (12.4% to 32.3%, p=0.026), local anaesthetic use and volume (75.3% to 93.5%, p=0.038), and insertion of additional ports, including location and size (87.6% to 100%, p=0.038). However, no individual criterion remained statistically significant following the Holm adjustment. The overall documentation score improved, from a median of 75.0% (IQR 68.8-81.2) to 81.2% (IQR 68.8-93.8; p=0.004). The revised template was used in only six of 31 re-audit cases (19.4%).

Conclusion: Documentation quality improved following a combined quality-improvement intervention involving revision of the operative note template and dissemination of audit findings to the surgical team. Although the overall documentation score improved significantly, no individual criterion remained significant after adjustment for multiple comparisons. Given the low uptake of the revised template, the observed improvements cannot be attributed independently to its introduction. Further work to improve template adoption, provide targeted education, and undertake prospective reassessment is required to establish the sustainability of these improvements and further improve compliance with GIRFT recommendations.

Categories: General Surgery
Keywords: clinical audit, documentation quality, gall bladder diseases and gallstones, general surgery, laparoscopic cholecystectomy (lc), patient care, standardized templates, surgical operative notes

Introduction

Operative notes are essential components of the surgical record, documenting intraoperative findings, procedural steps, and postoperative management. Appropriate documentation is highlighted by the General Medical Council as an important aspect of good medical practice [1]. Surgical notes facilitate communication between members of the multidisciplinary team and support continuity of care. In addition to this, they serve as important medico-legal documents. Surgical literature has demonstrated that up to 45% of operative notes are non-defensible in virtual court of law settings [2]. Overall, this shows the importance of maintaining appropriate standards with surgical documentation.

Accurate and comprehensive documentation is particularly important in laparoscopic cholecystectomy, where details of operative technique, anatomical findings and safety-related steps should be clearly recorded.

Getting It Right First Time (GIRFT) and the Royal College of Surgeons emphasise the importance of high-quality operative documentation [3,4]. The GIRFT Best Practice Laparoscopic Cholecystectomy Guidelines (2022) outline recommendations for documentation of practice in all patients undergoing laparoscopic cholecystectomy [3]. These comprise 32 recommendations covering key aspects of the procedure that should be documented, including the method of peritoneal access, intra-abdominal pressure, anatomical findings, attainment of the Critical View of Safety (CVS), management of bile or stone spillage, intraoperative complications, surgical errors or deviations from the intended operative approach, and postoperative considerations.

Previous studies have demonstrated that structured operative note templates can improve the completeness and quality of surgical documentation. For example, a closed-loop audit in orthopaedic surgery found improvements in documentation following the introduction of templated operative notes and changes to the documentation process [5]. These findings support the use of standardised templates as a quality-improvement intervention, although their effectiveness depends on consistent uptake.

The aim of this study was to assess compliance with selected documentation recommendations from the GIRFT Best Practice Laparoscopic Cholecystectomy Guidelines (2022) within a general surgery department at a tertiary NHS hospital. These guidelines represent national recommendations for best practice rather than a mandatory hospital policy. A secondary aim was to improve documentation practices through the implementation of a revised standardised operative note template and dissemination of the initial audit findings to the surgical team through departmental presentations and email communication.

Materials And Methods

A closed-loop retrospective audit was conducted at a tertiary hospital (Wythenshawe Hospital, Manchester University NHS Foundation Trust, Manchester, England). Sixteen criteria, derived from 14 recommendations within the GIRFT Best Practice Laparoscopic Cholecystectomy Guidelines (2022), were used to assess laparoscopic cholecystectomy operative notes (Tables *1*, *2*). These criteria were selected by departmental consultants based on their relevance to patient safety, operative documentation, and the potential for under-documentation. The audit was approved by the Clinical Audit Department at Manchester University NHS Foundation Trust and registered under ID U12981.

GIRFT guidelines
7. Record drugs given pre-operatively and during surgery, e.g., antibiotics, local anaesthetic
11. Record the open or closed technique used to enter the peritoneal cavity with Hasson or Veress needles and that the pneumoperitoneum was established prior to the laparoscope insertion
13. Document the insertion of the other ports both in terms of position (epigastric, right costal margin, etc.) and size (5/10/12mm) and that they were inserted under direct vision +/- use of local anaesthetic
14. Record the level at which the intra-abdominal pressure was set
16. Document the findings at the time of surgery, unusual anatomy which affected how the procedure was performed, whether the gall bladder had a thick or thin wall, whether there were adhesions and the manner in which they were divided, if appropriate
17. Record the dissection of Calot's triangle: whether the cystic duct was identified and traced to the gallbladder, whether the cystic artery was identified and traced to the gallbladder, and whether a safe view was established
19. Record the type and number of clips applied to the cystic duct and cystic artery
20. Record whether there was any bile or stone spillage, the presence of stones, and whether all split stones were fully or partially retrieved
21. Record the volume of saline used to wash out the abdomen
22. Document the method and port used to extract the gallbladder, including use of an endoscopic retrieval bag
23. Record that the tissue sample was sent to pathology
24. Record that haemostasis was achieved
25. Record that the ports were removed under direct vision
28. Document an estimate of the anticipated blood loss

TABLE 1: Summary of audited GIRFT guidelines

GIRFT: Getting It Right First Time [3]

	Audit criteria
1	Local anaesthetic use, including volume
2	Method of accessing the peritoneal cavity
3	Insertion of other ports (location and size)
4	Level of intra-abdominal pressure set
5	Anatomical findings
6	Dissection of Calot's triangle
7	Achievement of Critical View of Safety (CVS)
8	Type of clips used for cystic duct and artery
9	Number of clips used for cystic duct and artery
10	Bile or stone spillage documented
11	Volume used for abdominal washout
12	Method of gallbladder extraction
13	Tissue sent for histology
14	Haemostasis achieved
15	Ports removed under direct vision
16	Blood loss documented

TABLE 2: Audit criteria derived from the GIRFT guidelines

GIRFT: Getting It Right First Time [3]

Inclusion criteria

Operative notes for both elective and emergency laparoscopic cholecystectomies performed at the hospital during the specified audit periods were included.

Patient selection

The initial audit cycle involved a retrospective review of 100 laparoscopic cholecystectomy operative notes from procedures performed up to 30 September 2025. Three notes were excluded due to duplication, leaving 97 operative notes for analysis. At the time of this audit, surgeons were using the existing laparoscopic cholecystectomy operative note template available within the hospital's electronic documentation system. Following the initial audit, a new standardised operative note template was developed, and the audit findings were presented to the general surgical department. Emails were circulated to all surgical trainees and consultants to promote awareness and use of the revised template, and an explanatory poster was displayed in the operating theatres. All interventions were completed on 11 May 2026. The second audit cycle involved a retrospective review of all 31 laparoscopic cholecystectomy procedures performed at the hospital between 12 May and 16 June 2026. Therefore, the re-audit sample comprised all eligible procedures undertaken during this period rather than a predetermined sample size.

Intervention

Following the initial audit cycle, the findings were presented to the general surgery department, followed by a departmental discussion to determine which criteria should be incorporated into the revised template. It was agreed that criteria 4 and 11 (intra-abdominal pressure and abdominal washout volume, respectively) would be excluded, as the team felt that including these parameters would unnecessarily prolong operative note documentation without providing sufficient additional benefit. However, clinicians were encouraged to document both parameters more consistently where appropriate. Consequently, the final template incorporated 14 of the 16 initially audited criteria. The revised template was subsequently made accessible through the electronic documentation system using the smart phrase, .LAPCHOLEOP, which generated the updated proforma.

To promote awareness and uptake, a poster explaining the revised proforma was displayed in the operating

theatre where most laparoscopic cholecystectomies were performed and in the doctors' office within the theatre department (Figure *1*). General surgery consultants and trainees, who were responsible for completing the operative notes, were also informed via email about the revised template. The original and revised operative note templates are provided in Figures *2*, *3*, respectively. In Figure *2*, the area in the blue box must be deleted and replaced with .LAPCHOLEOP (Smart Phrase). Figure *3*'s content would replace the highlighted rectangle in Figure *2*. A subsequent review of operative notes from patients undergoing laparoscopic cholecystectomy after implementation of these interventions was undertaken to evaluate changes in documentation compliance.



FIGURE 1: Poster promoting the revised laparoscopic cholecystectomy operative note template

The figure was created using Google Gemini (Google LLC, Mountain View, California, United States).

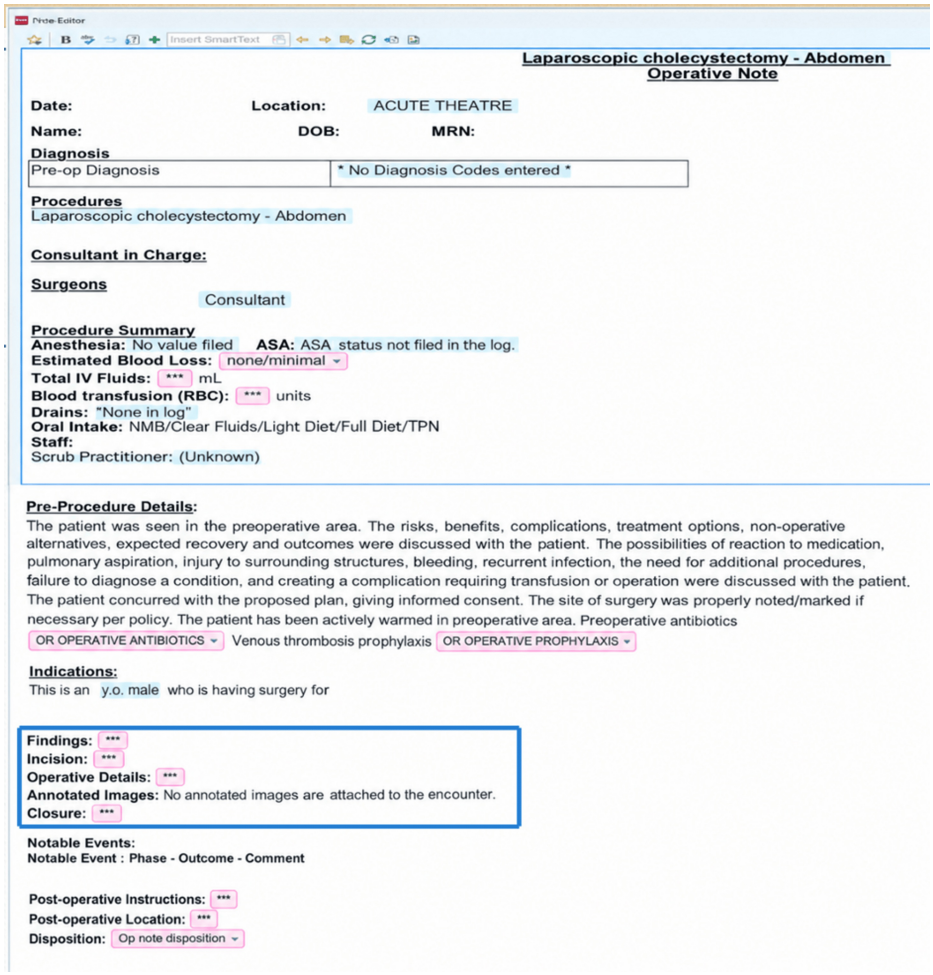


FIGURE 2: Original laparoscopic cholecystectomy operative note template

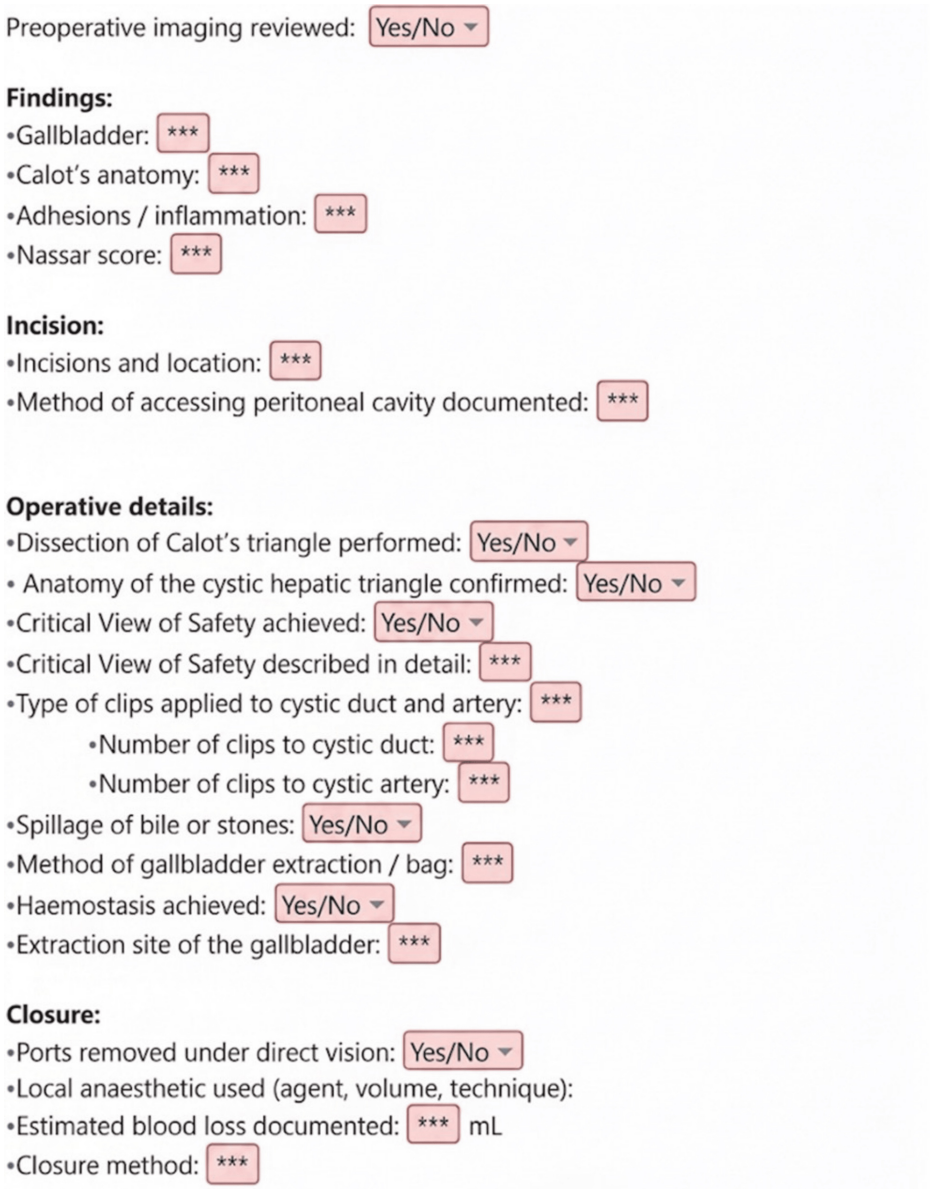


FIGURE 3: Revised laparoscopic cholecystectomy operative note template

Statistical analysis

Compliance with each criterion was calculated as the proportion of operative notes in which the item was documented. Proportions in the two audit cycles were compared using two-sided Fisher's exact test, chosen over the chi-square test because of small expected cell counts in the re-audit. Differences are reported in percentage points with 95% confidence intervals calculated by the Newcombe hybrid score method, and p-values were adjusted for the 16 criteria tested using the Holm method. An overall documentation score was calculated for each note as the percentage of applicable criteria documented and compared between cycles using the Mann-Whitney U test, with the rank-biserial correlation as the effect size. In exploratory analyses, re-audit notes written with and without the template were compared, as were cycle 1 notes and re-audit notes written without the template. A sensitivity analysis was performed after retaining only the first note for each medical record number. Entries recorded as not reported were counted as not documented, and one note in which histology was sent but not documented was excluded from the histology denominator. A p-value below 0.05 was considered statistically significant. Analyses were performed in Python (Python Software Foundation, Fredericksburg, VA) using SciPy and statsmodels.

Data collection

Operative notes from both audit cycles were reviewed against the sixteen predefined criteria (Table *2*). Following discussion with departmental consultants, a standard of 100% documentation was set for each

criterion. Documentation rates from the initial cycle were recorded to establish baseline compliance with the selected GIRFT recommendations. In the second cycle, documentation rates were reassessed and compared with the initial results to evaluate changes following the intervention. Uptake of the revised template during the re-audit period was also recorded.

Results

Initial audit cycle

A total of 97 laparoscopic cholecystectomy operative notes were reviewed in the initial audit cycle. The lowest documentation rates were observed for intra-abdominal pressure and abdominal washout volume, both recorded in 12% of cases. Documentation of clip type was also low (52%), followed by bile or stone spillage (62%).

In contrast, documentation was highest for tissue sent for histology (100%) and anatomical findings (95%). Haemostasis was documented in 90% of cases, while documentation of dissection of Calot's triangle and the method of gallbladder extraction reached 89% for both criteria.

Re-audit cycle

The second audit cycle reviewed 31 operative notes. During this period, the new standardised operative note template was used in 19.4% of cases. The lowest documentation rates remained for intra-abdominal pressure (22.6%) and abdominal washout volume (32.3%). Documentation of bile or stone spillage also remained suboptimal at 71%. Complete documentation (100%) was achieved for additional port insertion, including location and size; anatomical findings; dissection of Calot's triangle; and tissue sent for histology. Documentation of the method of gallbladder extraction improved to 96.8%, while local anaesthetic use and volume reached 93.5%.

Statistical analysis

Ninety-seven operative notes were included in the analysis of the initial cycle. The lowest documentation rates were for intra-abdominal pressure and abdominal washout volume (both 12/97, 12.4%), followed by clip type (50/97, 51.5%) and bile or stone spillage (60/97, 61.9%). Documentation was highest for tissue sent for histology (96/96, 100%), anatomical findings (92/97, 94.8%) and haemostasis (87/97, 89.7%).

In the re-audit cycle, thirty-one operative notes were reviewed, of which six (19.4%) used the new template. Four criteria reached 100% documentation: insertion of other ports, anatomical findings, dissection of Calot’s triangle, and tissue sent for histology. The lowest rates remained for intra-abdominal pressure (7/31, 22.6%), abdominal washout volume (10/31, 32.3%), clip type (20/31, 64.5%), and bile or stone spillage (22/31, 71.0%).

The largest improvements were in abdominal washout volume (+19.9 percentage points, 95% CI 4.0 to 38.2, p=0.026), local anaesthetic use and volume (+18.3, 95% CI 2.2 to 28.8, p=0.038) and insertion of other ports (+12.4, 95% CI 0.2 to 20.4, p=0.038). None remained significant after Holm adjustment (adjusted p=0.41, 0.57 and 0.57, respectively). Dissection of Calot’s triangle (+11.3, p=0.065) and clip type (+13.0, p=0.22) also improved without reaching significance. Changes in the remaining criteria were small, including peritoneal access (+5.7, p=0.59), number of clips and blood loss (both +1.3, p=1.0), and port removal under direct vision (+1.1, p=1.0). The overall documentation score improved significantly, from a median of 75.0% (IQR 68.8-81.2) to 81.2% (IQR 68.8-93.8) (p=0.004, rank-biserial r=0.34). No notes met all criteria in the initial cycle, compared with four in the re-audit (Table *3*).

Audit criterion	Cycle 1, n/N (%)	Cycle 2, n/N (%)	Difference (percentage points)	95% CI	p	Holm-adjusted p
Local anaesthetic use, including volume	73/97 (75.3)	29/31 (93.5)	+18.3	2.2 to 28.8	0.038	0.570
Method of accessing peritoneal cavity	79/97 (81.4)	27/31 (87.1)	+5.7	-11.6 to 17.5	0.590	1.000
Insertion of other ports (location and size)	85/97 (87.6)	31/31 (100.0)	+12.4	0.2 to 20.4	0.038	0.570
Level of intra-abdominal pressure set	12/97 (12.4)	7/31 (22.6)	+10.2	-3.6 to 28.2	0.243	1.000
Anatomical findings	92/97 (94.8)	31/31 (100.0)	+5.2	-6.3 to 11.5	0.335	1.000
Dissection of Calot’s triangle	86/97 (88.7)	31/31 (100.0)	+11.3	-0.7 to 19.2	0.065	0.840
Achievement of Critical View of Safety	80/97 (82.5)	28/31 (90.3)	+7.8	-8.6 to 18.7	0.400	1.000
Type of clips (cystic duct and artery)	50/97 (51.5)	20/31 (64.5)	+13.0	-7.1 to 30.4	0.222	1.000
Number of clips (cystic duct and artery)	77/97 (79.4)	25/31 (80.6)	+1.3	-17.0 to 14.9	1.000	1.000
Bile or stone spillage documented	60/97 (61.9)	22/31 (71.0)	+9.1	-10.6 to 25.4	0.397	1.000
Volume used for abdominal washout	12/97 (12.4)	10/31 (32.3)	+19.9	4.0 to 38.2	0.026	0.409
Method of gallbladder extraction	86/97 (88.7)	30/31 (96.8)	+8.1	-5.7 to 16.4	0.291	1.000
Tissue sent for histology	96/96 (100.0)	31/31 (100.0)	+0.0	-11.0 to 3.8	1.000	1.000
Haemostasis achieved	87/97 (89.7)	29/31 (93.5)	+3.9	-11.1 to 12.8	0.729	1.000
Ports removed under direct vision	74/97 (76.3)	24/31 (77.4)	+1.1	-17.6 to 15.7	1.000	1.000
Blood loss documented	77/97 (79.4)	25/31 (80.6)	+1.3	-17.0 to 14.9	1.000	1.000

TABLE 3: Documentation of audit criteria in the initial audit and re-audit

Notes written using the template had a higher overall documentation score than those written without it (median 96.9%, IQR 93.8-100 vs 81.2%, IQR 68.8-87.5; p=0.002), and washout volume was documented more often (5/6 vs 5/25, p=0.007) (Table *4*). Re-audit notes written without the template did not differ significantly from the initial cycle (median score 81.2% vs 75.0%, p=0.14), and no individual criterion differed significantly. A sensitivity analysis restricted to one note per patient gave similar results. Interestingly, documentation of abdominal washout volume was significantly higher in re-audit notes completed using the revised template compared with those completed without it (83.3% vs 20.0%, 5/6 vs 5/25; p=0.007), despite this criterion not being included in the revised template. This finding suggests that factors other than the template itself, potentially including increased clinician awareness following dissemination of the initial audit findings, may have contributed to improved documentation.

Audit criterion	No template (n=25), n/N (%)	Template (n=6), n/N (%)	p
Local anaesthetic use, including volume	23/25 (92.0)	6/6 (100.0)	1.000
Method of accessing peritoneal cavity	21/25 (84.0)	6/6 (100.0)	0.561
Insertion of other ports (location and size)	25/25 (100.0)	6/6 (100.0)	1.000
Level of intra-abdominal pressure set	4/25 (16.0)	3/6 (50.0)	0.110
Anatomical findings	25/25 (100.0)	6/6 (100.0)	1.000
Dissection of Calot’s triangle	25/25 (100.0)	6/6 (100.0)	1.000
Achievement of Critical View of Safety	22/25 (88.0)	6/6 (100.0)	1.000
Type of clips (cystic duct and artery)	14/25 (56.0)	6/6 (100.0)	0.066
Number of clips (cystic duct and artery)	19/25 (76.0)	6/6 (100.0)	0.309
Bile or stone spillage documented	16/25 (64.0)	6/6 (100.0)	0.145
Volume used for abdominal washout	5/25 (20.0)	5/6 (83.3)	0.007
Method of gallbladder extraction	24/25 (96.0)	6/6 (100.0)	1.000
Tissue sent for histology	25/25 (100.0)	6/6 (100.0)	1.000
Haemostasis achieved	23/25 (92.0)	6/6 (100.0)	1.000
Ports removed under direct vision	18/25 (72.0)	6/6 (100.0)	0.293
Blood loss documented	19/25 (76.0)	6/6 (100.0)	0.309

TABLE 4: Documentation of audit criteria in re-audit notes written without and with the template

Exploratory subgroup comparisons between re-audit notes completed with and without the revised template were performed using Fisher's exact test for individual documentation criteria and the Mann-Whitney U test for overall documentation scores. These exploratory comparisons were not adjusted for multiple testing, and their findings were interpreted cautiously.

Discussion

This audit identified improvements in documentation across most of the selected GIRFT criteria following the revision of the existing laparoscopic cholecystectomy operative note template. Four criteria achieved 100% documentation in the re-audit: additional port insertion, including location and size; anatomical findings; dissection of Calot's triangle; and tissue sent for histology. Histology documentation was already complete in the initial cycle, while the other three criteria improved to full compliance. This demonstrates that consistent documentation of these operative details is achievable.

Baseline documentation compliance varied considerably, ranging from 12% for intra-abdominal pressure and washout volume to 100% for histology. Similar inconsistencies have been reported in previous studies of laparoscopic cholecystectomy operative notes. A Dutch study across nine hospitals found that notes complied with national guidelines for only 52%-69% of items [6]. Following the release of the GIRFT guidance in 2022, a two-cycle local review found that no operative note contained all recommended information, and only 44% of post-guidance notes met at least 75% of the essential criteria. Similarly, an audit of 300 operative notes covering common general surgical procedures reported compliance rates of only 40%-75% across different sections of the operative note [7,8]. Together, these findings suggest that incomplete operative documentation is a widespread issue across hospitals nationally and internationally, rather than a problem unique to our department, reinforcing the relevance of the present audit.

However, several areas remain in clear need of improvement. These findings suggest that certain technical details may be overlooked during operative note completion and should be prioritised in future template revisions and targeted education. Documentation of bile or stone spillage and port removal under direct vision also remained incomplete, indicating further opportunities to improve the recording of operative steps. Although documentation of achievement of the Critical View of Safety improved, it did not reach 100%, making this another important area for continued attention given its relevance to operative safety [9].

The findings can also be compared with those of an audit conducted at a district general hospital, which

combined surgeon education with the introduction of a modified laparoscopic cholecystectomy proforma. This study reported improvements of 13%, 42% and 48% in documentation of Calot's triangle dissection, bile or stone spillage, and the gallbladder extraction port, respectively [10]. Similarly, the present audit found improvements following revision of the standardised operative note template. Documentation of Calot's triangle dissection increased from 88.7% to 100%, while documentation of the method of gallbladder extraction increased from 88.7% to 96.8%. Documentation of bile or stone spillage improved from 61.9% to 71%, representing a more modest increase than that reported in the district general hospital study. In addition, a closed-loop audit evaluating general surgical operation notes against Royal College of Surgeons guidelines reported improvements across all assessed criteria following the implementation of quality improvement measures [11]. Although this study was not specific to laparoscopic cholecystectomy, it supports the role of clinical audit and targeted interventions in improving the completeness of surgical documentation. Overall, these studies suggest that reviewing existing documentation practices, providing feedback and introducing standardised templates may help improve compliance with operative note guidance [11]. However, the relative contribution of each intervention cannot be established from these findings alone.

Additionally, substantially higher documentation of abdominal washout volume in notes completed using the revised template compared with those completed without it (83.3% vs 20.0%; p=0.007), despite this criterion not being incorporated into the template. This suggests that the improvement cannot be explained by the template's prompts alone. Instead, increased awareness of the audit findings following departmental presentations and communication may have influenced clinicians' documentation practices, including for criteria not explicitly included in the revised proforma. However, given the small number of notes completed using the template (n=6), this finding should be interpreted cautiously.

An important limitation is the low uptake of the revised template, which was used in only 19.4% of cases during the re-audit period. Consequently, the improvements observed cannot confidently be attributed to the template, as most re-audited procedures were documented without it. Other factors, including increased awareness of the audit criteria or changes in individual documentation practices, may have contributed. Improving uptake is therefore essential before the effectiveness of the revised template can be adequately evaluated. Other limitations include the smaller sample size in the re-audit compared with the initial cycle and the short interval between intervention and reassessment, which limits conclusions about sustained improvement.

An additional limitation is the potential influence of increased clinician awareness following the initial audit and dissemination of the findings. This may have resulted in improved documentation independently of the revised operative note template, representing a potential Hawthorne effect. Furthermore, the intervention comprised both template revision and departmental communication, making it difficult to distinguish the individual contribution of each component. As the revised template was used in only 19.4% of re-audit cases, the observed improvements should be interpreted as changes following the overall quality-improvement intervention rather than evidence of the independent effectiveness of the template.

Future work should focus on improving the routine use of the revised operative note template for all laparoscopic cholecystectomies. The audit findings should be shared with the surgical team to highlight improvements, reinforce areas of good practice and identify persistent documentation gaps. Feedback of audit findings to clinicians can support the identification of areas requiring further improvement [12]. Barriers to template uptake should be explored, and the revised template should be readily accessible within the electronic documentation system. Focused educational sessions should reinforce the importance of adhering to GIRFT guidance, particularly for intra-abdominal pressure, abdominal washout volume, clip type, bile or stone spillage, and port removal under direct vision [3]. Standardised templates have the potential to improve the completeness and consistency of operative documentation, although their effectiveness depends on appropriate implementation and consistent use [12]. A further re-audit following these measures would assess template uptake, evaluate whether documentation improvements have been sustained, and determine whether compliance with GIRFT recommendations has improved [12].

Conclusions

In conclusion, this audit demonstrated improvements in laparoscopic cholecystectomy operative note documentation following a departmental quality-improvement intervention involving template revision and dissemination of audit findings to the surgical department. However, the study design does not allow the independent effects of these interventions to be established, as these interventions were implemented concomitantly. Low uptake of the revised template and the potential influence of increased clinician awareness should be considered when interpreting the findings. Further work involving further refinement of the operative note template to improve its usability, completeness and alignment with GIRFT recommendations, alongside improved template adoption, targeted education and prospective reassessment, is required to determine whether these improvements can be sustained and whether greater compliance with GIRFT recommendations can be achieved.

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.

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Critical review of the manuscript for important intellectual content: Karim Awad, Patrizia Capozzi, Daisy Evans, Ephraim Khimbele

Supervision: Patrizia Capozzi, Daisy Evans

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue. **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 following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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