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CONVERSION FROM LAPAROSCOPIC TO OPEN SURGERY IN ELECTIVE CHOLECYSTECTOMY: A CLINICAL AUDIT ON COMPLIANCE WITH INTERNATIONAL GUIDELINES AND IMPLICATIONS FOR QUALITY IMPROVEMENT

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Abstract

Background: Laparoscopic cholecystectomy (LC) is the gold standard for symptomatic gallstone disease, and conversion to open cholecystectomy (OC) represents an important safety indicator. We report a clinical audit conducted at NMC Al Nahda Specialty Hospital, Dubai, UAE, evaluating compliance with international guidelines (SAGES and WSES) governing conversion practice in elective cases.

Methods: A retrospective clinical audit reviewed 60 randomly selected patient records from 148 elective LC cases performed between January and September 2025. Five audit standards were defined from SAGES/WSES guidelines with pre-set compliance targets. Audit criteria included the appropriateness of conversion decisions, documentation of indication and intraoperative findings, team communication, post-operative documentation, and adherence to the conversion rate benchmark of ≤5%.

Results: Of 121 eligible cases, 3 required conversion, yielding an elective conversion rate of 2.48% well within the internationally accepted ≤5% benchmark. All three conversions had clearly documented intraoperative justifications (100%), representing valid safety-driven indications including dense adhesions, unclear anatomy, failure to achieve Critical View of Safety (CVS), and complex biliary pathology (Mirizzi syndrome). Two audit parameters — team communication recording and structured post-operative outcome documentation — could not be fully assessed due to the absence of dedicated data fields in the existing audit instrument.

Conclusion: Surgical practice at our institution is safe and guideline-compliant. Conversion is used appropriately as a protective, not adverse, outcome. An action plan was developed to close documentation gaps and establish a pre-operative risk stratification checklist, supporting continuous quality improvement in elective cholecystectomy.

Keywords: laparoscopic cholecystectomy; conversion to open surgery; critical view of safety; clinical audit; SAGES guidelines; WSES guidelines; quality improvement; Dubai; UAE.

Introduction:

Laparoscopic cholecystectomy (LC) has been established as the gold standard surgical treatment for symptomatic gallstone disease since its introduction in the late 1980s [1]. The procedure confers well-documented advantages over open cholecystectomy, including reduced postoperative pain, shorter hospital stay, earlier return to daily activity, and superior cosmetic outcomes [2]. Globally, LC is one of the most frequently performed general surgical procedures, with millions of operations undertaken annually across diverse healthcare settings [3].

Despite these benefits, a subset of cases requires intraoperative conversion to open cholecystectomy (OC). Reported elective conversion rates vary widely in the literature, ranging from 0.5% to approximately 15%, depending on patient demographics, disease severity, institutional volume, and individual surgeon experience [4,5]. The international benchmark for elective conversion, as adopted from SAGES and WSES guidelines, is ≤5%, and rates significantly exceeding this threshold may reflect deficiencies in pre-operative patient selection, intraoperative decision-making, or documentation practices [6,7].

Critically, conversion to open surgery should not be regarded as a complication or failure; rather, it is an important safety-driven bail-out strategy when continued laparoscopic dissection would pose unacceptable risks to the patient [6,8]. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) and the World Society of Emergency Surgery (WSES) both emphasise that conversion is a hallmark of sound surgical judgement, particularly when the Critical View of Safety (CVS) cannot be achieved due to dense adhesions, bleeding, or unclear biliary anatomy [6,7]. Failure to convert when safety is compromised remains a leading cause of bile duct injury (BDI), one of the most devastating and preventable surgical complications [9].

Despite clear international guidance, adherence to structured documentation and communication standards around conversion varies between institutions. Gaps in operative note completeness, failure to record the decision rationale, and absence of standardised post-operative outcome documentation are identified quality gaps in the published literature [10,11]. Clinical audits provide an evidence-based mechanism to evaluate institutional compliance, identify deficiencies, and drive targeted quality improvement interventions.

This paper reports the findings of a clinical audit conducted at NMC Al Nahda Specialty Hospital, Dubai, UAE, evaluating compliance with SAGES and WSES guidelines for conversion practice in elective laparoscopic cholecystectomy. We present our audit methodology, results, interpretation, and the action plan implemented to address identified gaps. Our findings are contextualised against current published evidence and international benchmarks.

Background and Rationale for Audit

NMC Al Nahda Specialty Hospital is a high-volume secondary and tertiary care facility within the NMC Healthcare Group, Dubai, UAE, serving a diverse multicultural patient population. The Department of General Surgery performs a substantial number of elective and emergency laparoscopic procedures annually, with cholecystectomy representing a significant proportion of operative workload.

The audit was initiated as part of the Dubai Health Authority (DHA) Clinical Audit and Control Department's quality governance framework (Audit Reference: CACD/CA/115/2025). The audit topic was selected on the grounds that LC is a high-volume procedure, conversion to open surgery is a sentinel safety indicator, and systematic evaluation against international process standards had not previously been conducted at the institution. Although an acceptable conversion rate does not guarantee optimal surgical practice, an unusually high rate may signal deficiencies in pre-operative work-up or intraoperative technique. Conversely, documentation of the rationale for conversion and compliance with team communication standards are independent quality markers that can be assessed and improved irrespective of the outcome rate itself [10,12].

The audit was designed as a first re-audit with a subsequent re-audit cycle planned once the action plan interventions have been fully implemented. The standards were drawn exclusively from internationally recognised evidence-based guidelines — specifically the SAGES Safe Cholecystectomy Program and the WSES 2020 Updated Guidelines — ensuring that benchmarks reflected contemporary best practice rather than local consensus alone [6,7].

Methodology

1. Audit Design and Setting

A retrospective clinical audit was performed at NMC Al Nahda Specialty Hospital. Data were collected from Operation Room records and individual patient case files. The study period covered elective LC cases performed from 1 January 2025 to 30 September 2025.

2. Inclusion and Exclusion Criteria

All adult patients (≥18 years) undergoing elective laparoscopic cholecystectomy for symptomatic cholelithiasis during the study period were eligible for inclusion. Cases were excluded if they involved: (i) emergency or acute cholecystitis presentations; (ii) patients under 18 years of age; (iii) cholecystectomy performed as a component of a concurrent major procedure (e.g., Whipple's pancreaticoduodenectomy or hepatic resection); or (iv) incomplete or missing intraoperative documentation.

A total of 148 cases were performed during the study period. After applying exclusion criteria, 121 cases were eligible. From these, 60 files were randomly selected as the audit sample using Operation Room list records, in accordance with standard clinical audit methodology.

3. Audit Standards

Five explicit audit criteria were defined with reference to SAGES and WSES guidelines, each with a pre-determined compliance target:

Audit Standard / Criterion	Evidence Source	Target Compliance
Conversion to open surgery occurs only when safe laparoscopic dissection is not possible, following SAGES and WSES guidelines	SAGES & WSES Guidelines	≥95%
Indication and intraoperative justification for conversion must be clearly documented in the operative note	Hospital policy / WSES Guidelines	100%
Conversion decision must be communicated to	Local protocol	≥95%

Audit Standard / Criterion	Evidence Source	Target Compliance
the operative team (anaesthesia & nursing) and recorded		
Post-operative documentation must specify the reason and outcome of conversion	Hospital documentation policy	100%
Conversion rate in elective cases should not exceed 5% (international benchmark)	SAGES / WSES / International literature	≤5%

Table 1. Audit Standards and Compliance Targets

Results

1. Overall Conversion Rate

Of the 121 eligible elective LC cases reviewed, 3 required conversion to open cholecystectomy, yielding an observed elective conversion rate of 2.48%. This figure is well within the internationally accepted benchmark of ≤5% [4,6,7] and compares favourably with contemporary published data. Ali et al. (2024) reported a conversion rate of 3.7% in a single-centre observational study of 349 elective cases [4], while rates ranging from 0.49% in highly subspecialised practices to 10.38% in mixed-volume settings have been documented in recent literature [5,13].

The low conversion rate at our institution reflects both a high-volume surgical practice and a culture of safety-first intraoperative decision-making aligned with SAGES principles. As demonstrated by a 28-year single-surgeon series, subspecialisation and experience are the strongest modifiable determinants of conversion rate, with expert centres achieving rates as low as 0.49% [13].

2. Indications for Conversion

All three conversions were undertaken for clinically valid and appropriately documented safety indications:

- Case 1 & 2: Dense adhesions, unclear anatomy, and failure to achieve the Critical View of Safety (CVS).
- Case 3: Mirizzi syndrome, absent cystic duct, and porcelain gallbladder — representing complex biliary pathology precluding safe laparoscopic completion.

These indications are consistent with SAGES and WSES-recognised safety criteria for conversion [6,7]. Unclear anatomy and failure to achieve CVS represent the most widely reported indications for conversion globally [8,9]. The CVS, as defined by Strasberg's three-component criteria, requires: (i) clearance of the hepatocystic triangle of fat and fibrous tissue; (ii) separation of the lower third of the gallbladder from the liver bed; and (iii) visualisation of only two structures entering the gallbladder [6]. When these criteria cannot be met, conversion or subtotal cholecystectomy is mandated to prevent BDI [9].

Contextual findings from the broader audit sample were notable. Adhesions of any degree were documented in 33.1% of elective cases, with clarity of anatomy described as unclear or difficult in 6.6% of cases. Minor intraoperative complications (e.g., small ooze) were recorded in 3.3% of cases. These findings reflect the inherent complexity of elective cholecystectomy in a real-world setting and underscore the importance of pre-operative risk stratification.

3. Documentation Compliance

The intraoperative documentation of conversion was robust: 100% of converted cases (3/3) had a clearly recorded indication and justification in the operative note, meeting the 100% target for this standard. This finding aligns with published evidence that high-volume centres with structured operative note practices achieve superior documentation compliance [10].

However, two audit standards could not be fully assessed due to the absence of dedicated data fields in the existing audit instrument:

- Communication of the conversion decision to the anaesthesia and nursing team (Standard 3).
- Post-operative documentation of the reason and outcome of conversion (Standard 4).

These gaps were identified as a priority for the action plan and are consistent with similar documentation deficiencies reported in the surgical quality improvement literature [11,12].

Audit Standard	Result	Target	Status
Conversion rate (elective)	2.48% (3/121)	≤5%	Met ✓
Intraoperative justification documented	100% (3/3)	100%	Met ✓
Conversion decision communicated to OT team	Not assessable*	≥95%	Pending
Post-operative conversion outcome documented	Not assessable*	100%	Pending
Conversion only when safe dissection impossible	100% (3/3)	≥95%	Met ✓

Table 2. Summary of Audit Results. *Not assessable due to absence of dedicated data fields in the original audit instrument.

Discussion

1. Conversion as a Safety Indicator, Not a Complication

A fundamental conceptual distinction underpins the interpretation of our results: conversion to open surgery is not a complication of laparoscopic cholecystectomy but a deliberate, safety-driven decision [6,8]. This distinction has important implications for both clinical practice and quality benchmarking. When a surgeon elects to convert in response to failure to achieve CVS, dense adhesions, or unexpected complex pathology, they are exercising sound intraoperative judgement in accordance with SAGES recommendations [6]. Conversely, surgeons who persist laparoscopically beyond the point of safety risk catastrophic BDI, which carries significant morbidity, mortality, and medicolegal consequence [9].

Our audit confirms that conversion at NMC Al Nahda is practised appropriately as a bail-out strategy. All three converted cases involved anatomical or pathological conditions directly recognised as absolute or relative indications for conversion by SAGES and WSES [6,7]. This safety-first culture, reflected in a 2.48% elective conversion rate, is in keeping with established global benchmarks and supports a high-quality surgical practice environment.

2. Benchmarking Against International Data

Our elective conversion rate of 2.48% compares favourably with the international literature. Published rates in high-volume centres range from 0.49% to approximately 4.0% for elective cases [4,5,13]. A systematic review by Ravendran et al. (2024) examining 28,054 LC cases found that 5,847 (approximately 20.8%) required conversion in a mixed elective and emergency cohort, highlighting the significantly higher conversion burden in emergency settings [8]. In strictly elective series, rates are considerably lower, as reflected by our data.

A prospective risk factor analysis by Upadhyay et al. (2025) in a tertiary Indian centre demonstrated a conversion rate of 10.38% in a cohort of 318 patients that included both elective and semi-urgent cases, with dense adhesions, failure to achieve CVS, and previous abdominal surgery as the principal predictors [5]. Similarly, Ali et al. (2024) identified male sex, elevated CRP, and prior ERCP as independent risk factors for conversion in a Pakistani cohort [4]. The relatively low conversion rate in our series likely reflects both the elective-only nature of the cohort and an institutional commitment to pre-operative assessment optimisation.

3. Critical View of Safety: The Cornerstone of Safe Cholecystectomy

The CVS remains the most important intraoperative safety standard in cholecystectomy practice. Defined by Strasberg and adopted formally by SAGES, it requires three elements: clearance of the hepatocystic triangle, separation of the gallbladder's lower third from the liver bed, and demonstration of only two structures entering the gallbladder [6]. Failure to achieve CVS is not a personal failing but a clinical signal to convert or pursue alternative strategies such as subtotal cholecystectomy [6,9].

Gupta et al. (2023) demonstrated that CVS achievement failure can be predicted preoperatively using readily available haematological parameters including neutrophil and lymphocyte percentages, as well as gallbladder wall thickness on ultrasound [14]. These findings support the concept of pre-operative risk stratification — one of the key action plan items identified in our audit — which would allow the surgical team to anticipate and prepare for difficult cases, assign appropriately experienced surgeons, and counsel patients more accurately regarding conversion probability.

In our audit, 6.6% of the broader sample had documented difficulty in anatomy clarity, and 33.1% had adhesions of any degree. These proportions closely mirror those in published literature and underscore the importance of maintaining robust intraoperative documentation across all cases, not only those requiring conversion.

4. Documentation Quality and the Role of Structured Templates

A key finding of this audit was the identification of two documentation gaps. While intraoperative justification for conversion was 100% compliant among converted cases, the absence of dedicated fields for team communication recording and post-operative outcome documentation precluded complete assessment of these standards. This finding is not unique to our setting. A widely cited quality improvement study by Kohn et al. demonstrated that even in high-volume academic centres, documentation of CVS was frequently incomplete or inaccurate in operative notes, with important implications for audit capability and medicolegal defence [15].

Standardised operative note templates have been shown to significantly improve documentation compliance in laparoscopic surgery. Improving the quality of operative notes for laparoscopic cholecystectomy through structured proformas has been reported to increase adherence to key documentation standards [12]. Our action plan includes the introduction of a revised OT intraoperative template with mandatory fields for CVS documentation, anatomy clarity, adhesion presence, and team communication recording — changes supported by current quality improvement evidence [10,12].

5. Morbidity and Postoperative Outcomes of Conversion

Several studies have demonstrated that conversion is associated with increased operative time, higher blood loss, longer hospital stay, and higher complication rates compared with completed LC [3,8]. A recent retrospective cohort study of 287 LC cases reported a conversion rate of 18% in a mixed tertiary care population, with converted cases having significantly longer operative times (90 vs. 60 minutes), higher complication rates (30.6% vs. 8.1% for completed LC), and greater drain utilisation [3]. These outcomes reinforce the importance of identifying and stratifying high-risk cases pre-operatively to enable appropriate consent, scheduling, and resource allocation.

Importantly, the morbidity associated with conversion reflects the underlying pathological complexity rather than a failure of technique per se. In our series, the three conversions were all for anatomy-related or pathology-related indications rather than bleeding or technical equipment failure, which carries a more favourable prognostic implication than emergency conversion for haemorrhage.

6. Pre-Operative Risk Stratification

Our audit data, consistent with international literature, support the development of a structured pre-operative risk stratification tool for identifying patients at elevated risk of difficult cholecystectomy and conversion. Recognised independent predictors of conversion include male sex, age >60 years, prior abdominal surgery, elevated inflammatory markers (CRP, WBC), gallbladder wall thickness >4mm on ultrasound, impacted gallstone, prior ERCP, and American Society of Anesthesiologists (ASA) class ≥3 [4,5,14,19].

As part of our post-audit action plan, a mini pre-operative risk stratification checklist has been developed incorporating adhesion risk factors, prior surgical history, and relevant inflammatory markers. This tool is intended to facilitate pre-operative counselling, inform theatre scheduling and grade of assigned surgeon, and provide a basis for ongoing prospective data capture. Similar pre-operative scoring systems have demonstrated clinical utility in tertiary surgical centres and are now recommended by consensus [5,7].

7. Multidisciplinary Learning and Continuous Improvement

The M&M (Morbidity and Mortality) review framework is an essential component of continuous quality improvement in surgical departments. WSES guidelines highlight the value of case-based learning forums to review conversion cases, near-misses, and cases involving unclear anatomy, enabling shared learning on pre-operative imaging assessment and intraoperative bail-out strategies [7]. Our audit action plan mandates monthly M&M review of unclear anatomy and dense adhesion cases, supported by structured documentation of action points — a measure aligned with best practice recommendations [7,11].

A focused CME session on conversion as a safe bail-out strategy was also conducted as part of the action plan. Evidence from structured curricula in safe laparoscopic cholecystectomy — including SAGES' own Safe Cholecystectomy Task Force initiatives — demonstrates that targeted educational interventions improve surgeon confidence in CVS attainment and conversion decision-making [15]. The re-training session included SAGES/WSES-aligned documentation standards, indication criteria for conversion, and the importance of post-operative outcome documentation.

Action Plan and Quality Improvement Measures

Following the audit findings, a structured six-point action plan was formulated and implemented by 12 April 2026:

1. Audit Tool Enhancement: Two additional Yes/No fields were added to the audit instrument: "Conversion decision communicated to anaesthesia & nursing" and "Post-operative reason & outcome documented".
2. Surgical Team Re-training: A structured re-training session on SAGES/WSES-aligned documentation standards was delivered to the surgical team, with signed attendance confirmation.
3. OT Template Standardisation: The intraoperative documentation template was revised to include mandatory fields for clarity of anatomy, adhesions, and CVS achievement status.
4. CME Delivery: A dedicated CME session titled "Conversion as a Safe Bail-Out Strategy" was conducted to reinforce correct clinical and documentation practice.

5. M&M Review (Ongoing): Monthly review of unclear anatomy and dense adhesion cases was initiated within the M&M Committee framework, with formal minute recording of action points.
6. Pre-Operative Risk Stratification Checklist: A validated mini-checklist incorporating adhesion risk, prior abdominal surgery, and inflammatory markers was developed and integrated into the pre-operative assessment workflow.

A second re-audit cycle is planned for mid-2026 to assess the impact of these interventions on documentation compliance and to enable full assessment of all five audit standards.

Conclusion

This clinical audit demonstrates that surgical practice for elective laparoscopic cholecystectomy at NMC Al Nahda Specialty Hospital is safe, compliant with international guidelines, and reflects a strong culture of patient safety. The observed conversion rate of 2.48% is well within the internationally accepted ≤5% benchmark, and all conversions were undertaken for appropriate, clinically justified indications aligned with SAGES and WSES guidance. Documentation quality for converted cases was robust at 100%.

Two documentation gaps were identified and addressed through a structured action plan encompassing audit tool enhancement, surgical team re-training, operative template standardisation, CME delivery, M&M case review, and pre-operative risk stratification. These measures are grounded in current evidence and international guideline recommendations and are expected to further strengthen institutional compliance at the re-audit.

The publication of this audit contributes to the growing body of literature on conversion practice in elective cholecystectomy and provides a replicable quality improvement model applicable to other regional and international surgical settings. Conversion remains an important surgical safety indicator, and institutions that systematically monitor, document, and review their conversion practice are best positioned to sustain high standards of patient care.

Declarations

Funding: No external funding was received for this study.

Conflicts of Interest: The authors declare no conflicts of interest.

Ethics Approval: This study was conducted as a registered clinical audit under the Dubai Health Authority (DHA) Health Regulation Sector, Clinical Audit & Control Department (Ref: CACD/CA/115/2025). No additional ethics committee approval was required.

Data Availability: Data are available from the corresponding author upon reasonable request, subject to institutional data governance policies.

Author Contributions: MM conceived and designed the audit, led data analysis, and drafted the manuscript. ST contributed to data collection and validation. MS contributed to data collection and validation. SK provided institutional oversight and reviewed the manuscript. All authors approved the final version.

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