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Postoperative Outcomes and Pathology-Report Retrievability after Thyroid Surgery at a National Referral Hospital in Burundi: An Ambidirectional Hospital-Based Cohort Study, 2019-2024

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Abstract

Background: Thyroidectomy is performed for malignant or suspicious nodules, multinodular goiter, compressive disease, and selected benign thyroid disorders. In referral hospitals with constrained diagnostic and follow-up infrastructure, postoperative morbidity and the availability of final pathology reports are key dimensions of care quality. **Methods:** We analysed an ambidirectional hospital-based cohort of 265 patients who underwent thyroid surgery at the Centre Hospitalo-Universitaire de Kamenge, Burundi, between 1 September 2019 and 31 August 2024. The primary endpoint was the proportion of cases with a retrievable final histopathology report in the available clinical record. Secondary endpoints were indications, procedure extent, length of stay, chart-documented postoperative outcomes, and availability of recorded TI-RADS categories. Wilson 95% confidence intervals (CIs) were calculated for key proportions. **Results:** Thyroid surgery accounted for 265 of 3431 ENT operations (7.7%; 95% CI, 6.9 - 8.7). Women comprised 239 patients (90.2%), and total thyroidectomy was performed in 173 (65.3%). An uncomplicated immediate postoperative course was documented in 227 patients (85.7%); 38 (14.3%) were classified with at least one recorded complication category. Recorded postoperative hypocalcemia occurred in 29 patients (10.9%; 95% CI, 7.7 - 15.3), including 24 asymptomatic cases, 4 with cramps, and 1 with tetany requiring parenteral calcium gluconate. A final histopathology report was retrievable in

176 cases (66.4%; 95% CI, 60.5 - 71.8); 89 records had no retrievable final report. Six retrievable reports documented malignancy. Paired recorded TIRADS and histopathology data were available in 172 cases; sparse high-risk categories precluded diagnostic-performance analyses. **Conclusion:** Thyroid surgery at CHUK was associated with measurable chart-documented postoperative morbidity and a substantial gap in final pathology-report retrievability in the available record. Prospective quality-improvement work should prioritize standardized calcium documentation, specimen-to-report tracking, and structured postoperative voice and airway assessment.

Subject Areas

Surgery & Surgical Specialties

Keywords

Thyroid Surgery, Thyroidectomy, Postoperative Outcomes, Histopathology, Quality Improvement, Burundi

1. Introduction

Thyroidectomy is an essential treatment for selected thyroid nodules, multinodular goiter, compressive disease, substernal extension, toxic disease refractory to medical treatment, and thyroid malignancy. Contemporary thyroid-nodule and endocrine-surgery guidance emphasizes risk-stratified preoperative assessment, appropriate procedure selection, and planned postoperative surveillance [1]-[3].

In low- and middle-income country referral settings, surgical value is shaped not only by the operation itself but also by the reliability of pathology services, clinical records, referral interfaces, and follow-up. Global literature on surgical systems and health-system quality stresses that access to an operation is insufficient when the processes required for safe, effective, and auditable care are fragile [4] [5]. In Burundi and elsewhere in sub-Saharan Africa, cancer-care and diagnostic-system constraints make it especially important to report transparently what is documented and what is not retrievable in the clinical record [6]-[10].

Most thyroidectomy series quantify postoperative complications but do not concurrently describe the retrievability of final histopathology reports and completeness of key diagnostic documentation. These record-based endpoints do not establish that unobserved care did not occur; they instead identify measurable gaps in the traceability of postoperative diagnosis and follow-up.

The primary objective was to estimate the proportion of thyroid surgery episodes with a retrievable final histopathology report in the available clinical record. Secondary objectives were to describe operative indications and procedure extent, chart-documented postoperative outcomes, recorded hypocalcemia according to procedure extent, and availability of recorded TIRADS categories. The report was prepared with reference to the STROBE and RECORD statements [11] [12].

2. Methods

2.1. Study Design and Setting

This was an ambidirectional hospital-based observational cohort of patients who underwent thyroid surgery in the Otorhinolaryngology-Head and Neck Surgery service at the Centre Hospitalo-Universitaire de Kamenge (CHUK), Bujumbura, Burundi, between 1 September 2019 and 31 August 2024. The original study protocol combined prospective collection from 1 September 2019 to 31 January 2023 with retrospective collection from 1 February 2023 to 31 August 2024. The final assembled dataset was analysed as one cohort and is therefore not described as purely retrospective. CHUK is a national referral and teaching hospital. The local care pathway comprised clinical assessment, thyroid function testing, cervical ultrasound, operative treatment, inpatient observation, and postoperative follow-up.

2.2. Participants and Cohort Identification

The analytic cohort comprised patients who underwent thyroid surgery in the CHUK ENT and Head and Neck Surgery service during the study period. The original protocol excluded patients whose records were unavailable or materially incomplete and patients operated on in General Surgery. Neither screening logs nor exclusion counts by reason were retained; the cohort cannot therefore be confirmed as consecutive, and a complete STROBE participant-flow diagram cannot be reconstructed. The final analysed cohort included 265 patients aged 19 - 74 years. Two patients had a documented history of prior partial thyroid surgery.

2.3. Data Sources and Pathology-Report Retrieval

Data were abstracted from clinical files, operative documentation, thyroid hormone and calcium results, cervical ultrasound reports, inpatient and discharge documentation, and final histopathology reports available in the clinical record. Data were entered and analysed in Epi Info 7 in the original study. For this audit, a final histopathology report was considered retrievable when a final result was present in the available patient record at final abstraction. The study records did not document a systematic search of hospital archives, separate pathology-laboratory registers, operating-theatre registers, or electronic databases; they also did not record the personnel conducting retrieval, an independent verification process, or a final pathology-search date. A non-retrievable report is therefore a record-availability finding, not evidence that a specimen was not processed, a report was not issued elsewhere, a result was not communicated, or downstream care did not occur.

2.4. Outcomes and Operational Definitions

The primary endpoint was a retrievable final histopathology report in the available clinical record. Secondary endpoints were operative indication, procedure category, hospital stay, recorded postoperative hypocalcemia, cervical hematoma,

postoperative dysphonia, postoperative laryngeal dyspnea, and availability of a recorded TIRADS category. Recorded postoperative hypocalcemia was defined as a postoperative serum calcium value below 2.0 mmol/L or chart documentation of calcium-related treatment or symptoms. The records did not retain a denominator for postoperative calcium testing, patient-level numerical calcium values, assay method, laboratory reference range, timing of testing, albumin correction, parathyroid hormone results, or post-discharge surveillance completeness. Accordingly, this report uses the term recorded postoperative hypocalcemia and does not estimate transient or permanent postoperative hypoparathyroidism [13]-[15]. Cervical hematoma was defined as a chart-documented postoperative neck hematoma or bleeding event; postoperative dysphonia and laryngeal dyspnea were defined as chart-documented new voice and airway symptoms, respectively. Neither outcome represents laryngoscopically confirmed recurrent laryngeal nerve dysfunction because systematic postoperative laryngoscopy was not recorded. Detailed operational definitions and ascertainment limitations are provided in Supplementary **Table S2**.

2.5. Data Quality, Phase Comparability, Missingness, and Potential Bias

Available covariates were age, sex, goiter duration, thyroid function, ultrasound, recorded TIRADS category, operative indication, procedure category, length of stay, postoperative outcomes, and pathology-report availability. A case-level indicator distinguishing the prospective from the retrospective collection phase was not retained in the analytic dataset. Consequently, phase-specific comparisons of pathology retrievability, complication rates, follow-up, or record completeness could not be performed. This creates potential ascertainment bias because documentation practices may have differed by phase. Missing data were handled with available-case denominators; no imputation was undertaken. Procedure categories other than total thyroidectomy were not reported individually because the detailed source breakdown was internally inconsistent. All incomplete record-based outcomes are interpreted conservatively.

2.6. Statistical Analysis

Categorical variables are presented as counts and percentages with explicit denominators. Wilson 95% CIs were calculated for single proportions. Recorded hypocalcemia after total thyroidectomy versus other procedures is reported as absolute risk, Newcombe 95% CI for the risk difference, and a score 95% CI for the crude risk ratio. This unadjusted comparison does not establish causality because case mix and covariates could not be modelled reliably, and only one event occurred in the comparator group. TIRADS and histopathology were summarized descriptively only.

2.7. Ethical Considerations

Approved by the CHUK Institutional Ethics Committee. Patient identifiers re-

moved; waiver of consent granted for retrospective minimal-risk research, consistent with the Declaration of Helsinki.

3. Results

3.1. Cohort Characteristics

Among 3431 ENT surgical procedures during the study period, 265 were thyroid operations (7.7%; 95% CI, 6.9 - 8.7). The mean age was 45.97 years (range, 19 - 74), and 239 patients were women (90.2%; 95% CI, 86.0 - 93.2). Goiter duration was less than 1 year in 59 patients (22.3%), 1 - 5 years in 163 (61.5%), and 6 - 15 years in 43 (16.2%). Baseline and preoperative characteristics are summarized in Table 1.

Table 1. Baseline and preoperative characteristics of the analytic cohort (N = 265).

Characteristic	n/N (%) or summary	95% CI, %
Age, mean (range), years	45.97 (19 - 74)	SD not retained in source records
Female sex	239/265 (90.2)	86.0 - 93.2
Goiter duration < 1 year	59/265 (22.3)	17.7 - 27.6
Goiter duration 1 - 5 years	163/265 (61.5)	55.5 - 67.2
Goiter duration 6 - 15 years	43/265 (16.2)	12.3 - 21.1
Euthyroid at surgery	262/265 (98.9)	96.7 - 99.6
Hyperthyroid at surgery	3/265 (1.1)	0.4 - 3.3
Cervical ultrasound documented	265/265 (100.0)	98.6 - 100.0
Recorded TIRADS category available	233/265 (87.9)	83.5 - 91.3
Recorded TIRADS category unavailable	32/265 (12.1)	8.7 - 16.5
Previous partial thyroid surgery	2/265 (0.8)	0.2 - 2.7

Thyroid-function tests and cervical ultrasound were recorded for all patients. The TIRADS system used in individual ultrasound reports was not specified in the available data; categories were treated as locally recorded categories rather than as a single validated risk-stratification system.

3.2. Operative Indications, Procedure Category, and Hospital Stay

Multinodular goiter was the most frequent operative indication (145/265, 54.7%), followed by unilateral lobar nodules (90/265, 34.0%). Total thyroidectomy was performed in 173 patients (65.3%). The remaining 92 procedures were retained as an aggregate because the detailed source counts for non-total procedure categories could not be reconciled. Mean hospital stay was 2.06 days; 260 patients (98.1%) stayed for 2 days and 5 (1.9%) stayed for 5 days. The reason for prolonged stay was not consistently documented (Table 2).

Table 2. Operative indications and procedure category (N = 265).

Indication or procedure	n/N (%)	95% CI, %
Multinodular goiter	145/265 (54.7)	48.7 - 60.6
Unilateral lobar nodule	90/265 (34.0)	28.5 - 39.9
Substernal multinodular goiter	12/265 (4.5)	2.6 - 7.7
Chronic thyroiditis	10/265 (3.8)	2.1 - 6.8
Compressive goiter	8/265 (3.0)	1.5 - 5.8
Total thyroidectomy	173/265 (65.3)	59.4 - 70.8
Other thyroid procedure, aggregate	92/265 (34.7)	29.2 - 40.6

The original detailed breakdown of loboisthmectomy, subtotal thyroidectomy, completion/totalization procedures, and decompression was internally inconsistent. To avoid reporting unverified procedure counts, only the verified total-thyroidectomy count and the complementary aggregate are presented.

3.3. Histopathology-Report Retrievability

A final histopathology report was retrievable in 176 of 265 cases (66.4%; 95% CI, 60.5 - 71.8). In 89 cases (33.6%; 95% CI, 28.2 - 39.5), no final report was retrievable in the available clinical record. Of the 176 retrievable reports, 170 documented benign multinodular goiter and 6 documented malignancy. The six malignant reports were described in the original records as three adenocarcinomas, two papillary carcinomas, and one anaplastic carcinoma. No retrospective subtype harmonization was undertaken because slide review and a prespecified reclassification process were not documented (Table 3).

Table 3. Final histopathology-report retrievability and reported pathology (N = 265).

Outcome	n/N (%)	95% CI, %
Final histopathology report retrievable	176/265 (66.4)	60.5 - 71.8
Final histopathology report non-retrievable in available record	89/265 (33.6)	28.2 - 39.5
Benign multinodular goiter documented	170/265 (64.2)	58.2 - 69.7
Malignancy among retrievable reports	6/176 (3.4)	1.6 - 7.2

The non-retrievable category identifies incomplete record availability. The underlying mechanism - incomplete filing, archive-retrieval failure, delayed reporting, external pathology, or another cause-could not be determined from the available materials.

3.4. Postoperative Outcomes and Diagnostic Continuity

An uncomplicated immediate postoperative course was documented in 227 patients (85.7%). The source outcome table classified 38 patients (14.3%) across recorded complication categories, and the four category counts summed to 38. The categories were therefore treated as mutually exclusive as tabulated; however, the

handling of patients with multiple events was not described, so co-occurrence cannot be assessed. Recorded postoperative hypocalcemia was the most frequent category, occurring in 29 patients (10.9%). Twenty-four were described as asymptomatic, four had cramps, and one developed tetany requiring parenteral calcium gluconate. The data do not support a count of patients with a documented postoperative calcium result, a count of laboratory-confirmed versus treatment-only cases, or patient-level numerical calcium values. Six cervical hematomas were recorded; two were described as compressive and drained in the operating room. Readmission, systematic post-discharge outcome assessment, and cohort-level mortality were not pre-specified and could not be assessed reliably (Table 4).

Table 4. Immediate postoperative outcomes, hospital stay, and diagnostic continuity (N = 265).

Outcome	n/N (%) or value	95% CI, %	Additional detail
Mean hospital stay	2.06 days	-	Dispersion measure not retained.
Hospital stay of 2 days	260/265 (98.1)	95.7 - 99.2	Reason for longer stay not consistently documented
Hospital stay of 5 days	5/265 (1.9)	0.8 - 4.3	Reason not consistently documented
Uncomplicated immediate postoperative course	227/265 (85.7)	80.9 - 89.4	Immediate postoperative record
At least one recorded complication category*	38/265 (14.3)	10.6 - 19.1	Severity and timing incompletely documented
Recorded postoperative hypocalcemia	29/265 (10.9)	7.7 - 15.3	24 asymptomatic; 4 cramps; 1 tetany. Calcium test denominator, timing, assay, and values not retained.
Cervical hematoma	6/265 (2.3)	1.0 - 4.9	Two compressive hematomas drained in operating room; management of four others not recorded.
Postoperative dysphonia	2/265 (0.8)	0.2 - 2.7	No systematic laryngoscopy or subsequent management documented.
Postoperative laryngeal dyspnea	1/265 (0.4)	0.1 - 2.1	No uniform laryngoscopy or confirmed airway diagnosis documented.
Retrievable final histopathology report	176/265 (66.4)	60.5 - 71.8	Final pathology report available in record.

*The source outcome table contained hypocalcemia, cervical hematoma, postoperative dysphonia, and postoperative laryngeal dyspnea. It did not report event timing, standardized severity grading, handling of multiple events, reoperation status beyond two hematoma drainage procedures, or post-discharge outcomes.

3.5. Recorded Hypocalcemia according to Procedure Extent

Recorded postoperative hypocalcemia was documented in 28 of 173 total thyroidectomies (16.2%; 95% CI, 11.4 - 22.4) and 1 of 92 other thyroid procedures (1.1%; 95% CI, 0.2 - 5.9). The unadjusted risk difference was 15.1 percentage points (95% CI, 8.3 - 21.4), and the crude risk ratio was 14.9 (95% CI, 2.7 - 86.2). Estimates are imprecise because only one event occurred in the comparator group and do not account for differences in disease extent, indication, or patient risk (Table 5).

Table 5. Recorded postoperative hypocalcemia by procedure extent.

Procedure group or effect measure	Events/denominator	Estimate	95% CI
Total thyroidectomy	28/173	16.2%	11.4 - 22.4
Other thyroid procedure, aggregate	1/92	1.1%	0.2 - 5.9
Risk difference (total minus other procedures)	-	15.1 percentage points	8.3 - 21.4
Crude risk ratio	-	14.9	2.7 - 86.2

3.6. Recorded TIRADS and Histopathology Data

Complete recorded TIRADS and retrievable histopathology data were available for 172 cases. Categories were TIRADS II in 36 cases, TIRADS III in 132, TIRADS IV in 2, and TIRADS V in 2. The corresponding documented malignancy counts were 0, 3, 1, and 2, respectively (Supplementary Table S1). Because only four cases were classified as TIRADS IV or V, diagnostic-performance, calibration, or predictive analyses were not undertaken (Figure 1).

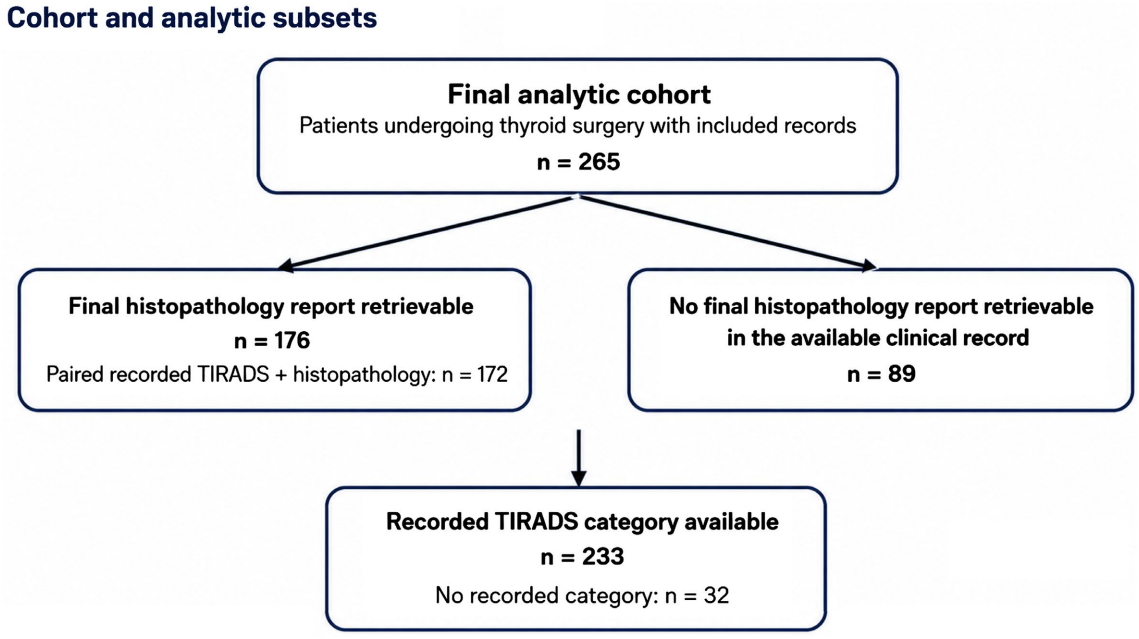

Figure 1. Cohort and analytic subsets. Screening and exclusion counts were not retained; this figure presents the final cohort and nested analytic subsets rather than a complete STROBE participant-flow diagram.

4. Discussion

4.1. Principal Findings

This five-year CHUK cohort provides three directly measurable findings: chart-documented immediate postoperative outcomes, short in-hospital stay patterns, and final histopathology-report retrievability in the available clinical record. Multinodular goiter was the dominant operative indication, total thyroidectomy was the most frequently recorded procedure, and 260 of 265 patients had a documented two-day stay. An uncomplicated immediate postoperative course was recorded in 227 patients, whereas 38 were classified in a recorded complication category. One third of operations had no retrievable final pathology report in the available record. These findings should be interpreted as care-pathway measurements rather than direct estimates of biological outcome or service-wide pathology capacity.

4.2. Postoperative Morbidity and Calcium Documentation

Recorded postoperative hypocalcemia was the most frequent event and was concentrated among total thyroidectomies. This direction of association is clinically coherent and consistent with the broader literature, but the present analysis is descriptive and unadjusted [16]-[19]. Its interpretation requires discipline: the available data do not distinguish biochemical hypocalcemia, treatment-only diagnoses, and clinically suspected cases with a patient-level laboratory denominator. Nor do they support estimates of transient or permanent postoperative hypoparathyroidism. The immediate operational priority is therefore not merely to reduce an observed percentage but to establish a standardized postoperative calcium pathway: a defined testing time point, assay and reference-range documentation, symptom assessment, treatment algorithm, and planned follow-up [13]-[15] [20].

The hematoma rate was low in absolute terms, yet two of six hematomas were described as compressive and required operating-room drainage. Because post-thyroidectomy hematoma may deteriorate rapidly, local pathways should include standardized airway-risk recognition, emergency escalation, and documentation of timing and management [21]. Similarly, chart-documented dysphonia and laryngeal dyspnea should not be equated with proven recurrent laryngeal nerve injury in the absence of systematic laryngeal examination. Structured preoperative voice documentation, postoperative symptom assessment, and targeted laryngoscopy would provide a safer and more interpretable framework [22] [23].

4.3. Pathology-Report Retrievability as a Diagnostic-Continuity Measure

A retrievable final pathology report was present for 176 of 265 operations, leaving 89 cases without a report in the available record. This should not be interpreted as the frequency of unprocessed specimens, missed malignancy, or lack of postoperative communication. It is a record-availability signal that indicates a break in diagnostic continuity. Without a documented specimen-to-report process, the

hospital cannot reliably determine whether a specimen was dispatched, received, processed, reported, filed, communicated, and acted upon. The immediate quality-improvement response should be a low-cost closed-loop register linking the operative date and specimen identifier to laboratory receipt, report release, clinician acknowledgement, patient communication, and next action [24].

The reported malignant cases were retained exactly as recorded. Although contemporary WHO classification has refined thyroid-tumour taxonomy, retrospective diagnostic relabeling would require a prespecified process and, ideally, slide review; neither was available here [25] [26]. The malignancy proportion among retrievable reports must not be interpreted as the malignancy rate among all operated patients because pathology was non-retrievable for one third of the cohort.

4.4. Imaging Documentation, TIRADS, and Missingness

Ultrasound was documented for all patients, and a recorded TIRADS category was available in 233 of 265 cases. Among the 172 patients with paired TIRADS and retrievable histopathology data, no malignancy was documented in TIRADS II nodules, whereas malignant diagnoses were reported in TIRADS III (3/132), TIRADS IV (1/2), and TIRADS V (2/2) categories. These findings are strictly exploratory and must not be interpreted as evidence of local diagnostic performance. The very small number of TIRADS IV-V cases (n = 4), incomplete pathology retrievability, and absence of documentation of the specific TIRADS framework used precluded valid estimation of sensitivity, specificity, predictive values, discrimination, calibration, or local validation.

Nevertheless, the findings highlight the operational importance of structured imaging documentation and reliable imaging-pathology linkage. Future ultrasound reports should specify the TIRADS system applied, document standardized sonographic features, nodule size, cervical lymph-node findings, and the relationship between imaging risk category, biopsy or surgical decision-making, and final pathology. This approach would strengthen diagnostic traceability and enable future validation of ultrasound risk stratification within the local care pathway [1] [2] [26]-[29].

4.5. Hospital Stay and Overall Chart-Documented Outcomes

The mean hospital stay was 2.06 days, and 98.1% of patients had a recorded stay of 2 days. This pattern indicates that the service commonly uses a short postoperative admission pathway. It should not, however, be interpreted as evidence that early discharge was uniformly safe or appropriate: discharge criteria, timing of calcium testing, post-discharge contact, readmission, and the reasons for the five longer stays were not consistently documented. Likewise, the 85.7% uncomplicated-course figure reflects the immediate postoperative record rather than standardized surveillance for delayed complications. The 14.3% figure should be interpreted as the proportion classified in a documented complication category; the source did not explicitly confirm that categories were mutually exclusive.

4.6. Strengths and Limitations

Strengths include a five-year institutional cohort, explicit denominators, severity information for recorded hypocalcemia, documentation of two compressive hematomas requiring drainage, and the inclusion of pathology-report availability as a transparent record-based endpoint. Important limitations must be acknowledged. First, the source collection was mixed prospective and retrospective; the final cohort is not purely retrospective. Second, the number of screened and excluded records was not retained. Third, postoperative outcome ascertainment depended on routine documentation, with no standardized timing of calcium testing, no PTH-based classification, no systematic laryngoscopy, and no reliable capture of delayed morbidity or readmission. Fourth, the source did not explicitly establish whether postoperative event categories were mutually exclusive, and timing, severity grading, and management were incompletely documented for several outcomes. Fifth, the detailed procedure breakdown, consultation-delay categories, and mortality narrative contained source discrepancies. Sixth, non-retrievable pathology reports cannot be attributed to a specific operational cause. These limitations constrain causal inference, outcome benchmarking, and external generalizability.

4.7. Evidence-Supported Quality-Improvement Priorities

Three immediate priorities are supported directly by the audit. First, the service should test a standardized postoperative calcium documentation pathway, particularly after total thyroidectomy, with predefined timing of calcium assessment, symptom review, treatment thresholds, escalation for cramps or tetany, discharge advice, and a documented follow-up plan. Second, a paper-based or hybrid specimen-to-report tracker should be piloted, using a unique specimen identifier, laboratory accession confirmation, report-return reconciliation, documented clinician review, and escalation rules for overdue reports. Closed-loop pathology result tracking has been identified as a strategy to improve communication and follow-up reliability [29]. Third, postoperative surveillance should include a structured voice and airway checklist, with selective laryngeal examination for dysphonia, dyspnea, persistent symptoms, or other high-risk features. These priorities should be evaluated prospectively as quality-improvement interventions rather than inferred to be effective from this retrospective audit.

4.8. Future Research and Pathway Maturation

This cohort should serve as the baseline for a prospective, implementation-focused programme of thyroid-surgery pathway improvement at CHUK. The next phase should prospectively collect the TIRADS category and the specific classification system used; indication and procedure type; perioperative calcium and PTH, where available; calcium supplementation and escalation; postoperative voice and airway symptoms; laryngoscopy findings when indicated; pathology accession, turnaround time, retrieval, filing, and clinician review; and follow-up ac-

tions after malignant diagnoses. A feasible initial cycle could test a six-month specimen-tracking intervention alongside standardized calcium documentation after total thyroidectomy and a postoperative voice-symptom checklist linked to selective laryngoscopy. The principal endpoints should be pathway reliability and completeness of documented care, not premature diagnostic-performance benchmarking.

5. Conclusion

In this hospital-based cohort, thyroid surgery at CHUK was associated with predominantly uncomplicated immediate postoperative records, while documented hypocalcemia was concentrated after total thyroidectomy. The most important systems finding was a substantial gap in final histopathology-report retrievability in the available record. A pragmatic quality-improvement package should prioritize standardized calcium documentation, specimen-to-report tracking, and structured postoperative voice and airway assessment. These actions are feasible, measurable, and likely to improve both patient safety and the auditability of thyroid care in a resource-constrained referral setting.

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Ethics Approval and Consent to Participate

Approved by the CHUK Institutional Ethics Committee. Patient identifiers removed; waiver of consent granted for retrospective minimal-risk research, consistent with the Declaration of Helsinki.

Availability of Data and Materials

The dataset was derived from routinely collected hospital records and is not publicly available because of confidentiality requirements. De-identified aggregate data may be considered on reasonable request, subject to institutional authorization.

Conflicts of Interest

The authors declare no competing interests.

Author Contributions

LH and OM conceptualized the study. LH, OM, GN, SN, and JN contributed to data acquisition, interpretation, manuscript development, and critical revision. All authors approved the final manuscript.

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Supplementary Material

Table S1. Recorded TIRADS category and documented malignancy among cases with both variables available (n = 172).

Recorded TIRADS category	Cases, n	Documented malignancy, n
II	36	0
III	132	3
IV	2	1
V	2	2
Total	172	6

The high-risk strata were sparse. These data must not be interpreted as a diagnostic-performance evaluation, validation, calibration analysis, or predictive model.

Table S2. Core operational definitions and ascertainment limitations.

Outcome/variable	Operational definition	Key ascertainment limitation
Final histopathology-report retrievability	Final report present in the available patient record at final abstraction.	No documented standardized archive, laboratory register, theatre register, or electronic database search; no final search date recorded.
Recorded postoperative hypocalcemia	Postoperative serum calcium < 2.0 mmol/L or documentation of calcium-related treatment or symptoms.	No calcium-testing denominator, patient-level results, test timing, assay/reference range, albumin correction, PTH, or follow-up completeness.
Cervical hematoma	Chart-documented postoperative neck hematoma or bleeding event.	Event timing and management were incomplete except for two compressive hematomas drained in the operating room.
Postoperative dysphonia	Chart-documented new postoperative voice symptom.	No systematic laryngoscopy, severity grading, or later outcome documentation.
Postoperative laryngeal dyspnea	Chart-documented airway symptom after surgery.	No uniform laryngoscopy or confirmed airway diagnosis; cannot be interpreted as confirmed nerve dysfunction.
Prospective vs retrospective phase	Study protocol included both phases.	No case-level phase indicator in analytic data; group comparison could not be performed.