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UPPER GIT SURGERY

Upper gastrointestinal endoscopy training: impact of the COVID pandemic on general surgery trainees

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Background: Upper gastrointestinal endoscopy (UGE) is a vital skill for general surgeons, yet the adequacy of training in low-resource settings like South Africa remains unclear. This study assesses endoscopy training for general surgery registrars at Groote Schuur Hospital, with a focus on the impact of the COVID-19 pandemic.
Methods: A retrospective analysis of the Upper Gastrointestinal Surgery Registry was conducted from 1 April 2018 to 30 September 2024. Data on diagnostic and interventional UGEs were reviewed across three periods: pre-COVID-19, during COVID-19, and post-COVID-19. Registrar exposure was evaluated based on the number of procedures performed during a standard three-month rotation. Descriptive and comparative statistical methods were applied ($p < 0.05$).
Results: Of 12 455 UGEs, 6 901 (55.3%) were performed by registrars. Diagnostic procedures accounted for 66.9% of all UGEs, with registrars performing 64.1%, while interventional procedures made up 33.1%, with 37.8% performed by registrars. Training during the COVID-19 period was significantly reduced, with only two registrars completing full rotations, compared to the usual 12–18. Although procedural volume increased post-COVID – 21.8% for diagnostic and 60.2% for interventional UGEs – median registrar exposure per rotation dropped from 131 pre-COVID to 112 post-COVID. This indicates that despite increased service delivery, registrar training opportunities did not return to pre-pandemic levels.
Conclusion: General surgery registrars at Groote Schuur Hospital receive substantial endoscopy exposure; however, the COVID-19 pandemic disrupted training significantly. Enhancing simulation-based learning and optimising rotations are crucial to ensure adequate competency in UGE.
Keywords: general surgery training, upper gastrointestinal endoscopy

Introduction

Upper gastrointestinal endoscopy (UGE) is an essential diagnostic and therapeutic procedure, particularly for general surgeons in sub-Saharan Africa. Concerns about the quality and provision of endoscopy training have been highlighted, specifically in the United Kingdom (UK), where traditional methods of assessing competency through estimated procedure numbers or subjective evaluations are being questioned. Increasingly, there is a shift towards objective methods to ensure proper training and proficiency in endoscopy.[1,2,3]

The Joint Advisory Group on Gastrointestinal Endoscopy (JAG), established in the UK in 1994, has been instrumental in setting standards for endoscopy training and ensuring quality assurance. Despite these advancements, challenges remain. Studies by Hammond et al.[2] underscore the need for improved structured training sessions within surgical curricula, emphasising the importance of skilled trainers and the role of simulation training. These studies also highlight the necessity of competency-based assessment, such as direct observation of procedural skills (DOPS), to address variability in training outcomes.[2-7] While all surgical trainee endoscopies are directly supervised locally, a standardised competency-based assessment such as DOPS is not followed, with training presently assessed only quantitatively as procedures completed without assistance.

In sub-Saharan Africa, the capacity for endoscopy remains severely limited, with studies conducted by organisations like the African Esophageal Cancer Consortium (AfrECC) revealing critical gaps in healthcare infrastructure, with many countries lacking adequate therapeutic and emergency endoscopy services, equipment and trained personnel. In some countries, the resources available for gastrointestinal endoscopy are less than 10% of those in high-income nations.[8-11]

Parker et al.[8] highlighted the gastrointestinal endoscopy experiences of surgical trainees across rural Africa, noting a lack of exposure to advanced procedures and insufficient training opportunities, which further underscores the need for initiatives like the Pan-African Academy of Christian Surgeons (PAACS) and increased investment in training infrastructure.[12] There is a discrepancy between the recommended numbers of procedures needed for certification, with even the American Board of Surgery (ABS) and the American Society of Gastroenterologists (ASGE) setting different benchmarks for achieving competency.[13,14] No recommended guidelines exist for the South African surgical trainee.

During the COVID-19 pandemic practical endoscopy training was significantly disrupted, with an increased reliance on simulation-based training as an alternative. Simulation based endoscopy training opportunities are highly variable both in quality and availability, with no upper endoscopy simulation available at our institution. The pandemic highlighted the importance of adaptable training methods to ensure that surgeons and gastroenterologists continue to develop necessary skills despite such disruptions.[15,16]

Methods

This study was a retrospective analysis using data from the Upper Gastrointestinal Surgery Registry (UGSR), an ethically approved and prospectively maintained registry (HREC R031/2015) which includes all endoscopic procedures performed within the unit. Conducted at Groote Schuur Hospital (GSH), the study focused on general surgery registrars rotating through the Upper Gastrointestinal Surgery Unit, with each rotation typically lasting three months and including 2–3 registrars. The primary training focus is on diagnostic upper UGEs, with limited exposure to interventional procedures. The unit also accommodates subspecialty medical and surgical gastroenterology fellowship trainees and visiting consultants. Due to the standard rotation being only 3 months, the unit does not follow a formal competency-based assessment, like DOPS, but rather aims to provide the general surgery registrar with quantitative exposure ensuring sufficient practical skills to safely and confidently perform diagnostic UGEs.

The Upper Gastrointestinal Surgery Unit is responsible for three emergency UGE and two interventional lists per week. A consultant is always present in the endoscopy suite. Trainees who are endoscopic novices are taught upper endoscopy sequentially in four steps, performing a single step repeatedly and only proceeding to the next component on satisfaction of the attending consultant performing the UGE. Step one is retroflexion within the stomach to view the proximal stomach; step two is to negotiate from the oesophagus down along the lesser curve to the pylorus; step three is passing through the pylorus into the second part of the duodenum. As the majority of our diagnostic scopes are performed without sedation, the final step of intubating the oesophagus is left until last when the trainee is more adept at handling the endoscope. We find this stepped approach allows time to appreciate the handling of the endoscope, allows for repetitive teaching, with minimal disruption to service delivery and patient discomfort. The speed of progression is individualised to the trainee. The study period spanned 78 months (1 April 2018 – 30 September 2024), divided into three COVID-19-related phases: Pre-COVID-19 (1 April 2018 – 26 March 2020), COVID-19 (27 March 2020 – 1 October 2021), and Post-COVID-19 (2 October 2021 – 30 September 2024). The dates of the 18-month COVID-19 phase were chosen based on the national COVID-19 lockdown period in South Africa.

All endoscopies performed by the Upper GI Surgery Unit at GSH during the study period were included and analysed according to whether a registrar performed the procedure or not. Registrar-performed UGEs included both full and partial procedures, provided the registrar actively handled the endoscope during key components of the case. Analysis of individual registrar endoscopy exposure was performed for all registrars who completed a standard 3-month rotation. Overall numbers of UGEs performed with an adjusted value including the total number of UGEs performed by an individual registrar over time (total rotation time in weeks present in the unit, excluding any periods of absence or leave)

Table I: Overall diagnostic and interventional UGEs performed with comparison between those performed by registrars and those not performed by registrars

	Total	Registrar		No Registrar	
		n	%	*n*	%
Diagnostic UGEs	8333	5343	64.1%	2990	35.9%
Interventional UGEs	4122	1558	37.8%	2564	62.2%
Interventions Specified					
Oesophageal dilatation	1265	439	34.7%	826	65.3%
Oesophageal stenting	1127	473	42.0%	654	58.0%
NJT[a]/NGT[b]	388	95	24.5%	293	75.5%
Gastric/duodenal dilatation	367	140	38.1%	227	61.9%
Gastric/duodenal stenting	320	80	25.0%	240	75.0%
Gastrostomy insertion/removal	273	181	66.3%	92	33.7%
Endoclip insertion or removal (TTS[c] or OTS[d])	136	48	35.3%	88	64.7%
Polypectomy/EMR[e]/ESD[f]	93	18	19.4%	75	80.6%
Endoscopic diathermy coagulation	81	38	46.9%	43	53.1%
Variceal banding/sclerotherapy	78	37	47.4%	41	52.6%
APC[g]	78	30	38.5%	48	61.5%
Endoscopic botox injection	75	21	28.0%	54	72.0%
Endoscopic adrenaline injection	68	30	44.1%	38	55.9%
RFA[h]	19	2	10.5%	17	89.5%
Other interventions[i]	48	15	31.3%	33	68.8%

[a]NJT – Nasojejunal tube, [b]NGT – Nasogastric tube, [c]TTS – Through-the-scope, [d]OTS – Over-the-scope, [e]EMR – Endoscopic mucosal resection, [f]ESD – Endoscopic submucosal dissection, [g]APC – Argon plasma coagulation, [h]RFA – Radio-frequency ablation, [i]Other interventions: oesophageal stricture incisional therapy or intralesional steroid injection (*n* = 15), foreign body removal (*n* = 14), biliary/pancreatic stent removal (*n* = 13), oesophageal endovac placement (*n* = 4), vocal cord medialisation (*n* = 1), cyanoacrylate injection into oesophageal fistula tract (*n* = 1).

were reviewed. This adjusted value gives a more accurate assessment of the exposure related to the time actually spent in the unit. Registrars who joined the unit temporarily or did not complete a full rotation were excluded from the individual registrar analysis; however, their endoscopies performed were still included in the overall analysis. This study was approved by the University of Cape Town Human Research Ethics Committee (HREC 995/2024).

Statistical analysis

Data exploration and analysis were conducted using IBM SPSS Statistics (v29.0) and Microsoft Excel. Descriptive statistics summarised numerical data as means ± standard deviation for normally distributed variables and as medians with interquartile ranges for non-parametric data. Group differences were analysed using t-test for numerical variables, Pearson's chi-square or Fisher's exact test for categorical data, and the Kruskal-Wallis test with post-hoc Mann-Whitney U tests for multi-group comparisons. A p-value of < 0.05 was considered statistically significant.

Results

A total of 12 455 UGEs were performed during the 78-month study period, with an average of 159.9 procedures per month. Of these, 8 333 (66.9%) were diagnostic UGEs, while 4 122 (33.1%) were interventional (Table I). Registrars were involved in 6 901 UGEs (55.3%), performing an average of 88.5 procedures per month, with 5 343 (64.1%) being diagnostic and 1 558 (37.8%) interventional.

The impact of the COVID-19 pandemic was evident in registrar training volumes. Before the pandemic, 19 registrars were trained, completing 69.6% of UGEs. During the COVID-19 period, only two registrars were trained, completing 35.9% of UGEs, indicating a significant reduction in procedural exposure. In the post-COVID-19 period, 25 registrars were trained, completing 53.5% of UGEs (Table II). It was estimated that 10–16 general surgery registrars missed their rotations due to the pandemic.

When reviewing normal service delivery periods (excluding COVID-19), pre- and post-COVID-19 service delivery requirements to the unit have changed with a clear increasing trend noted. There was a 21.8% increase in diagnostic UGEs performed in the third period compared to pre-COVID-19. Similarly, an even more significant increase was noted in the interventional UGE service delivery requirements to the unit with a 60.2% increase.

Although the median UGEs per registrar increased during the COVID-19 period (212.5 vs. 131 pre-COVID-19), this was solely due to the reduced number of registrars rotating through the unit. Only two registrars completed full rotations during the COVID-19 timeframe, resulting in a significant loss of training opportunities for the broader cohort. In the post-COVID-19 period, per-registrar exposure declined further, with a median of 112 UGEs (IQR: 103–154). Although total procedural volume increased post-COVID-19 (6218 UGEs for 25 registrars vs. 3959 for 19 registrars pre-COVID-19), resulting in a higher average potential exposure (248 vs. 208 scopes per registrar), this does not reflect real

Table II: Comparison of all UGEs performed by registrars in the three COVID time periods*

	Pre-COVID		COVID		Post-COVID		
	Total UGEs	Registrar UGEs	Total UGEs	Registrar UGEs	Total UGEs	Registrar UGEs	*p*-value[#]
Total UGEs (*n* = 12455)	3959	2756 (69.6%)	2271	817 (35.9%)	6218	3328 (53.5%)	**< 0.001**
Diagnostic UGEs (*n* = 8333)	3028	2242 (74.0%)	1429	596 (41.7%)	3876	2505 (64.6%)	**< 0.001**
Interventional UGEs (*n* = 4122)	931	514 (55.2%)	849	221 (26.0%)	2342	823 (35.1%)	**< 0.001**

*This number includes all UGEs performed by registrars, including UGEs performed by registrars not completing a standard 3-month rotation through the Upper Gastrointestinal Unit. These UGE numbers are thus greater than the numbers shown in Table III. [#]Comparisons done across three groups performed with Kruskal-Wallis test. Post-hoc analysis comparing Pre-COVID-19 to COVID-19, Pre-COVID-19 to Post-COVID-19 and COVID-19 to Post-COVID-19 in the Total UGE, Diagnostic UGE and the Interventional UGE groups were performed using the Mann-Whitney U test and all these comparisons reached statistical significance. **Note:** Only two general surgery registrars completed full rotations during the COVID period, compared to 19 in the pre-COVID and 25 in the post-COVID periods. This context is essential when interpreting the registrar-performed UGEs.

Table III: Comparison of UGEs performed by individual registrars completing a standard 3-month rotation and adjusted mean number of UGEs performed per week in the three COVID-19 time periods. (This analysis only includes registrars who completed full 3-month rotations; registrars who did not complete a full rotation were excluded from this analysis.)

	Pre-COVID-19	COVID-19	Post-COVID-19	*p*-value[a]	Post-hoc analysis[b]		
Number of registrars trained	19	2	25				
Overall UGEs per 3-month rotation					Pre vs COVID	Pre vs Post	COVID vs Post
Total UGEs	131.0 (105.0–178.0)	212.5 (188.0–237.0)	112.0 (103.0–154.0)	**0.024**	**0.023**	0.126	**0.011**
Diagnostic UGEs	103.0 (81.0–142.0)	149.5 (127.0–172.0)	89.0 (73.0–107.0)	**0.022**	0.231	**0.035**	**0.023**
Interventional UGEs	26.0 (16.0–35.0)	63.0 (61.0–65.0)	29.0 (26.0–40.0)	**0.031**	**0.023**	0.231	**0.006**
Adjusted mean UGEs per week[c]							
Total UGEs	12.4 (10.5–14.1)	17.7 (17.1–18.2)	11.8 (10.4–12.4)	**0.039**	**0.023**	0.265	**0.011**
Diagnostic UGEs	9.7 (8.7–11.5)	12.4 (11.6–13.2)	8.9 (7.6–9.7)	**0.012**	0.072	**0.027**	**0.023**
Interventional UGEs	2.62 (1.8–3.0)	5.3 (5.0–5.6)	3.0 (2.4–4.0)	**0.014**	**0.023**	0.073	**0.006**

All data represented as median with interquartile range. [a]Comparisons done across three groups performed with Kruskal-Wallis test. [b]Post-hoc analysis using Mann-Whitney U test comparing Pre-COVID-19 to COVID-19, Pre-COVID-19 to Post-COVID-19 and COVID-19 to Post-COVID-19 time periods. [c]Adjusted mean UGEs per week considered the total number of UGEs performed by an individual registrar over the total rotation time period (in weeks) when they were actually present in the unit and thus excluded any periods of absence or leave. **Note:** Only two registrars completed standard 3-month rotations during the COVID-19 period, which explains the higher per-registrar procedural numbers in this group. These values reflect concentrated exposure for a small number of trainees rather than improved training overall.

training distribution. The inclusion of an upper GI surgery fellow and rotating medical gastroenterology fellows may have diverted procedural opportunities away from general surgery registrars. Additionally, the greatest increase was seen in interventional procedures, which are less suitable for novice training. A significant reduction in adjusted weekly median UGEs was observed during the COVID-19 and post-COVID-19 periods ($p < 0.05$), underscoring the pandemic's negative impact on procedural exposure and training continuity (Table III).

Discussion

This study evaluates the UGE training for general surgery registrars at GSH, focusing on procedural exposure, the impact of the COVID-19 pandemic, and alignment with international training standards, such as those recommended by the JAG on gastrointestinal endoscopy.

Registrars performed a substantial proportion (55.3%) of all UGEs, with a focus on diagnostic procedures (64.1%), while participation in interventional procedures remained limited (37.8%). This imbalance reflects the unit's primary objective of ensuring basic diagnostic competency within the three-month rotation. Internationally, JAG emphasises competency-based training with structured assessments like the DOPS and a minimum of 200 diagnostic procedures for competency. However, GSH registrars train within a significantly shorter timeframe, averaging 131 procedures per rotation. Despite this substantial exposure, the absence of structured competency assessments locally limits objective verification of readiness for independent practice.

The COVID-19 pandemic significantly disrupted training, reducing procedural exposure and limiting the number of trained registrars to only two during the pandemic period, compared to 19 pre-COVID-19 and 25 post-COVID-19. The sharp decline in procedural volume (35.9% of UGEs performed during COVID-19) underscores the vulnerability of traditional training models and highlights the need for simulation-based and virtual learning platforms to ensure continuity in skill development during crises. Although the number of UGEs performed per registrar increased during the COVID-19 period, this was a reflection that only one registrar (instead of the usual 2–3) was present during the rotation period. With only two registrars completing the standard training during the COVID-19 period, this reflects very poorly as regards the endoscopic exposure for the registrar group as a whole.

Overall endoscopy exposure rates (including both observation and hands-on training) increased after COVID-19 from 208 (3959 UGEs for 19 registrars) to 248 (6218 UGEs for 25 registrars). However, despite training volumes improving post-pandemic, with registrars performing 53.5% of UGEs, procedural completion remained below pre-pandemic levels (112 vs. 131 UGEs per registrar). This suggests that either the unit has not fully recovered its training capacity, likely due to resource constraints and increased service demands or the training commitments have altered with time. While the post-COVID-19 period showed an increase in total UGEs and a higher average number of procedures per registrar (248 vs. 208 pre-COVID-19), this did not translate into improved hands-on training. The unit now trains a full-time upper GI fellow and periodically hosts medical gastroenterology fellows, which likely reduces the number of cases available to general surgery registrars. In addition, the most substantial increase in volume occurred in interventional UGEs, which are typically consultant- or fellow-led and not suitable for novice registrars. As a result, the increased service load has not necessarily improved the training experience for general surgery registrars.

Compared to international standards, the shorter but intensive training at GSH provides substantial exposure, yet interventional training for general surgical registrars remains limited. This is in part due to the unit now having an obligation to train a full-time upper gastrointestinal surgery fellow plus rotating gastroenterology fellows in interventional endoscopy. While interventional endoscopy training is not the primary aim for a novice endoscopy trainee, incorporating simulation-based training, as seen in international programmes, could enhance procedural competence and bridge gaps in interventional exposure for our general surgery registrars.

The study's strengths include the use of a prospectively maintained registry, allowing a detailed analysis of training outcomes. However, limitations include its retrospective design and the absence of competency-based assessments. Future studies should incorporate validated assessment tools like DOPS to objectively evaluate registrar proficiency. To optimise training, GSH would benefit from competency-based assessments, increased interventional exposure, and extended rotations. Additionally, innovative strategies such as tele-mentoring, modular training, and simulation-based learning could enhance skill acquisition in resource-limited settings, ensuring alignment with global training standards.

Conclusion

The training programme at GSH's Upper GI Surgery Unit provides significant procedural exposure within a short three-month rotation, particularly in diagnostic endoscopy. However, the training duration and volume fall short of international standards, such as those endorsed by JAG, which assume longer training periods and higher procedure counts. Limited interventional exposure further highlights gaps in skill development. While the programme offers a strong foundation, adopting competency-based assessments, expanding interventional training, and integrating simulation-based learning will be crucial to achieving international standards and preparing registrars for independent practice. Addressing these areas will ensure the programme remains competitive and continues to produce highly skilled surgeons.

Conflict of interest

All authors declare no conflict of interest

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Ethical approval

This study was approved by the University of Cape Town Human Research Ethics Committee (HREC 995/2024).

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