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Development and acceptability of a structured postoperative feedback tool for cataract surgery training (cataRANT)

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Research Article

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Abstract

Purpose

Cataract surgery has a steep learning curve, requiring timely and structured feedback to support effective skill acquisition during ophthalmology residency. Our objective was to develop a structured cataract surgery feedback tool that supports a succinct and humanistic debrief following a learning opportunity.

Methods

A development and acceptability project employing qualitative methods, including observational fieldwork, interviews, and thematic analysis, was carried out at two tertiary eye centers (February to May 2025, United Kingdom). CataRANT, a five-component feedback tool (Context, Analyze, Teach, Apply, Rant), was developed during a single ideation session using design thinking principles and experiential learning theory. Ophthalmology attendings with formal cataract trainer roles were purposively sampled and invited to provide feedback on cataRANT in training-approved theatres.

Results

Of 16 scheduled theatre sessions, 10 (62.5%) were observed. A formal educational debrief between educator and trainee occurred in only 3 of 10 sessions (30%), compared with a team safety debrief in 9 of 10 (90%); all three educational debriefs was initiated by the resident rather than the educator. Ten semi-structured interviews yielded four themes: challenges of curriculum implementation, timing of feedback, target audience, and surgical mentorship. All educators interpreted cataRANT in under one minute, with favorable acceptability throughout.

Conclusions

CataRANT provided a brief, memorable structure that surgical educators found acceptable and quick to interpret and valued for supporting educator-trainee dialogue. The feedback principles may extend to other specialties where debrief is integral to the educational cycle and high-volume lists are becoming routine. Validation among ophthalmology residents is required.

Keywords

Formative Feedback, Cataract Extraction, Internship and Residency, Clinical Competence, Ophthalmology.

Introduction

The first formal surgical residency program was conceived by Dr William Stewart Halsted in an era of ‘see one, do one, teach one’ learning. The program was based on an apprenticeship model of surgical education, where hours spent in hospital correlated with competency and career progression [1]. Reform to modern surgical residency curricula has been driven by the need to promote structured standardized postgraduate education, increasing the sustainability of surgical careers, and adopting competency-based curricula, alongside simulation, for demonstrating proficiency [2].

Cataract surgery is one of the most widely performed operations worldwide and carries a steep learning curve. Early exposure to cataract surgery teaching is conducted using high-fidelity ophthalmic simulators [3–5], yet this is often undertaken in isolation, without formal supervision [6], and with variable access [7]. Whether self-directed or educator-led, structured feedback is central to closing the surgical education feedback loop, developing technical proficiency, and increasing the efficiency of learning [8–10]. In the simulation suite, as in the operating room, the debrief is the mechanism by which practice becomes learning, yet it is also the component most readily truncated when supervisory time is scarce, or simulation is done as solo practice [3,6,7].

Modern surgical curricula require high-quality feedback to support technical skill acquisition that translates to intraoperative performance [8,9,11]. Without timely guidance, repeated errors during blind rehearsal can lead to inferior practices and threaten patient safety [6,12]. Surgical errors that result in preventable adverse events result in direct healthcare costs of $17–29 billion annually, encompassing lost income, disability and associated hospital costs [12]. Surgical practice already accepts the use of brief, structured checklists for supporting patient safety and team debriefs [13], yet

structured educational equivalents remain inconsistently used in routine training [9,14,15]. Effective error correction requires either real-time feedback, or a high degree of intrapersonal intelligence, the latter typically acquired through lived experiences [16]. This is particularly important in high-volume surgical specialties, such as cataract surgery, where case volumes can be as high as 80 surgeries in a 6-hour surgical block [15,17]. Existing feedback tools for cataract surgery tend to be highly granular, reliant on detailed scoring rubrics, and time-intensive; characteristics that are poorly suited to the demands of a busy theatre workflow and risk undermining the educator-trainee bond central to effective surgical education [18–20]. Real-time feedback should be concise, actionable, and preserve space for dialogue between trainee and educator, supporting the experiential learning process [21] and fostering surgical mentorships that are integral to career development [22].

Several structured frameworks for educational debriefing already exist in other surgical fields and the wider healthcare profession. The Briefing, Intraoperative teaching, Debriefing (BID) model anchors each case to learner-set objectives agreed upon preoperatively and closes with a four-step debrief [23]. SHARP (Set learning objectives, How did it go, Address concerns, Review learning points, Plan ahead) offers a comparable approach as a five-prompt aide-memoire, and demonstrated substantial debriefing improvements following live theatre cases [24,25]; it has since been implemented in other healthcare systems [26]. Beyond the operating room, there are structured feedback frameworks that apply to simulation [27] and for the purpose of building stronger educator-learner relationships [28]. Despite these frameworks, structured operative feedback remains limited in both quantity and quality [29], and none were designed specifically for high-volume procedural lists where the educator-trainee relationship spans several sequential cases, rather than just one.

Our objective was to develop a feedback tool for cataract surgery that adapts established surgical debriefing principles to high-volume lists, is informed by experiential learning theory and supports a concise, but humanistic, debrief following a learning opportunity.

Methods

Setting and participants

A prospective educational development and acceptability project was conducted at two independent eye hospitals between February – May 2025. Participants were surgical educators, defined as attending ophthalmologists who were qualified cataract trainers and had residents performing cases during theatre. Educators were purposively sampled across both sites to capture variation in training role, subspecialty interest and years of trainer experience. Ten attending ophthalmologists (n = 10) participated; the same educators were observed during theatre sessions and subsequently interviewed.

This study fulfills the criteria for an exempt educational development and acceptability project as determined by the regional Health Research Authority (National Health Service, United Kingdom) [30]. Risks to participants were minimal and all ophthalmology attendings were fully briefed on the project's purpose and intention for academic dissemination. Verbal informed consent was obtained and deemed proportionate given the non-invasive and professionally familiar nature of participation in a non-vulnerable professional cohort. Participants were able to withdraw at any time without consequence. No clinical interventions, patient data, or trainee performance data were involved, further minimizing risk.

All data was anonymized at the point of collection, stored securely in accordance with institutional data protection protocols, and accessible only to the project investigators. No personally identifiable information was collected. All procedures were conducted in accordance with the Declaration of Helsinki.

Design

The project was split into three distinct phases: observational fieldwork, ideation session, and semi-structured interviews. Given that the project sought to characterize educators' subjective perceptions of a novel tool rather than to measure an objective effect, an interpretivist paradigm was adopted throughout design, analysis and interpretation [31].

Observational Fieldwork

Both project investigators visited bi-weekly theatre sessions for one month (total 16 sessions, six cataract cases per list). During these sessions, investigators acted as silent observers and asked for permission to witness the educator-trainee interaction. Structured paper notes were taken to generate discussion points for the ideation session with the following questions:

1. Was there a formal debrief following each cataract case?
2. If present, what was the nature of the debrief?

Ideation Session

A single virtual ideation session lasting one hour was held between the two investigators within one week of completing the observational fieldwork. Using design thinking principles, the objective was to develop a feedback framework to improve existing educational surgical debriefs following cataract surgery. According to the Stanford model of design thinking [32] – empathize, define, ideate, prototype, test – the initial phases of empathizing and defining were grounded in the principal investigator's direct experience within an ophthalmology residency program and structured observational fieldwork. The problem was defined as an overall lack of

case-specific feedback during theatre sessions. The tool was therefore designed to be less formal than existing scoring instruments to prioritize time efficiency within theatre [18–20], to support experiential learning theory in facilitating knowledge transfer [21], and to create space for an educator-trainee dialogue that underpins surgical mentorship [22]. Ideation and prototyping would be achieved during the ideation session, and testing would be carried out during semi-structured interviews with ophthalmology attendings.

Semi-Structured Interviews

One-to-one semi-structured interviews [33] were conducted with 10 senior surgical educators at the end of theatre sessions. The same cohort of educators were approached from the observational fieldwork. The objective was to explore the subjective opinions of surgical educators towards the novel feedback tool. A sample of 10 was chosen a priori and was considered by the investigators sufficient to approach thematic saturation [34].

Five minutes was allocated for surgical educators to become familiar with the tool before open-ended questions, such as ‘what do you think?’ or ‘would you consider using it?’, were used to stimulate conversation during the interview. To assess time utilization, a smartphone stopwatch (Apple, CA, USA) was used to assess the time taken to interpret the feedback tool. Each interview was audio recorded and automatically transcribed using smartphone recording software (Apple, CA, USA). Transcript accuracy was checked by a single investigator (YSB) and then analyzed following an established framework and drawing on grounded-theory principles of constant comparison, whereby each transcript segment was compared against the evolving code structure [35,36]. Both project investigators reviewed the transcripts,

developed codes independently, and virtually met to reach an agreement on themes. Coding was conducted in NVivo (Lumivero, Denver, CO, USA). Candidate themes were reviewed against the coded extracts and the original transcripts using thematic maps before being defined and named. Coding discrepancies were resolved by discussion until consensus was reached; no third adjudicator was involved.

Results

Observational Fieldwork

In total, 10 (10/16, 62.5%) cataract theatres were visited (two were cancelled, four had no surgical educator present). During this period, only three sessions (3/10, 30.0%) had a formal educational debrief between the attending ophthalmologist (surgical educator) and resident (trainee), whereas 9 sessions (9/10, 90.0%) had a formal debrief with the wider surgical team as part of a surgical safety checklist. Educational debrief sessions were all initiated by the resident, most commonly a middle-grade trainee (at least three years' experience in ophthalmology), asking for feedback.

Two debrief styles were observed across three debriefs. The first involved using video-based analysis where postoperative recordings were paused and examined on a surgical monitor attached to the operating microscope (Carl Zeiss Meditec, Jena, Germany). Surgical educators would pause, slow, or accelerate to specific moments of the surgical case to highlight areas for improvement. The second resembled a 'feedback sandwich' approach whereby the surgical educator provided a positive comment for the case, followed by an improvement area, finally ending on a learning point, or positive note, to take into future cases.

Ideation Session

Following three rounds of iterative discussion, a feedback framework was developed and titled 'cataRANT' (Figure 1). This tool encompassed five key components: Context, Analyze, Teach, Apply and 'Rant'. A prototype was developed as an A4-size document, which could either be accessed digitally or printed. The feedback tool ends with an informal conversation – 'Rant' – about topics that are either relevant, or

peripheral, to the learning event. The recommendation is to conduct the final ‘Rant’ at the end of the theatre list, rather than in-between individual cases, to support discussions about the overall theatre workflow, career advice, mentorship, or life outside work. The purpose of this element was to humanize the individuals involved in the educational feedback process, to create a more relaxed theatre experience, and to foster a positive professional educator-trainee relationship.

Semi-Structured Interviews

A total of 89 minutes of interview material was recorded and underwent iterative thematic analysis. Twenty-seven unique codes were generated and four major themes emerged: challenges of implementation in a surgical curriculum, timing of feedback, target audience (both receiving and delivering feedback) and surgical mentorship (Table 1). Overall, the cataRANT tool received favorable acceptance among all participating surgical educators.

Feasibility

All surgical educators read and interpreted the cataRANT in under one minute on the computer with no additional costs. Only one educator required a second reading pass with brief clarification, after which understanding was universal. Assuming a two-minute post-case debrief and a concluding 10-minute end-of-list ‘Rant’, the cataRANT would add approximately 22 minutes of structured teaching across a six-case list. Timings were estimated rather than measured.

Discussion

This development and acceptability project addressed a gap in cataract surgery training: the lack of brief, humanistic feedback tools suitable for high-volume surgical settings. Our observations suggest that resident-specific feedback was infrequent and that cataRANT, at least from an educator's perspective, provided a memorable framework for feedback generation and was valued for the dialogue it could create.

Current State of Feedback

Formal educational debriefs occurred in only one-third of observed theatre sessions, despite team debriefs occurring in almost all cases. The discrepancy is striking as surgical practice already accepts the use of structured safety checklists for improving patient safety [13], and structured educational debriefing frameworks exist [23,24,28], yet none were observed in use to support the trainee's learning [9]. Residents in several healthcare systems are active contributors to surgical service delivery and therefore their education should not be ignored in the theatre environment [14,37,38]. When feedback was provided, it primarily involved video review or a brief 'feedback sandwich'. Video-based feedback is educationally rich and supports experiential learning [21], but is often impractical in busy high-volume cataract lists and not feasible for every case. The feedback sandwich, although efficient and memorable, is overused in healthcare, partially losing its educational meaningfulness, and limits any extracurricular dialogue beyond the educational encounter [9]. CataRANT seeks to balance efficiency and depth by structuring reflection using Kolb's learning cycle [21] and to support discussion using the 'Rant' component, whilst simultaneously fostering a less hierarchical educator-trainee relationship. Unlike checklist-based tools [18,19],

cataRANT prioritizes formative dialogue over granular assessment of individual steps, supporting a more humanistic debrief.

Amongst observed educational debriefs, all three were initiated by the resident rather than the educator. This places the burden of soliciting feedback on the least senior member of the operating team, at precisely the moment when confidence may be lowest following an imperfect case or surgical error. This also suggests residents who are less assertive, less experienced or less secure in the surgical team hierarchy may be less likely to initiate feedback at all [16]. As a result, the deficit may reflect initiation as much as time, possibly because no structure prompted educators to begin rather than because they were unwilling. An alternative explanation is that most observed cases were performed by competent middle-grade residents for whom educators judged feedback unnecessary. Either way, a named, memorable framework, such as cataRANT, may help to support the initiation of feedback from surgical educators.

Comparison with Existing Surgical Debriefing Frameworks

CataRANT shares its core premise with BID and SHARP: a brief, named structure is more likely to prompt a debrief than a general expectation that feedback will be given [23,24]. Our tool differs in three respects that reflect its intended setting. First, BID and SHARP both begin before the case, with learning objectives agreed preoperatively [23,24]. In high-volume cataract lists, where turnover may fall below ten minutes [38,39], a pre-case briefing for every case is difficult to sustain, so cataRANT was designed to operate entirely as a postoperative debrief. Second, because the same procedure is repeated across a list, the ‘Apply’ step can be enacted on the next case within minutes, closing Kolb’s cycle within a single session [21]. In comparison, the ‘Plan ahead’ in SHARP often looks toward a future, and frequently different, operation

[24]. Third, cataRANT separates two timescales: a succinct case-level debrief and an end-of-list ‘Rant’, the latter reserved for career guidance and mentorship. Neither BID nor SHARP provides a dedicated space for dialogue beyond the case, although the importance of the relationship in feedback is well recognized in models such as R2C2 [28].

CataRANT is therefore best viewed as an adaptation of established debriefing principles to the high-volume procedural list, rather than a replacement for them. SHARP currently has the stronger evidence base, having improved observer-rated debriefing quality using a validated instrument [24–26], whereas cataRANT has so far been evaluated only for educator acceptability. In lower-volume settings with more varied case mix, SHARP or BID may be equally or more appropriate.

Experiential Learning and the cataRANT Framework

The cataRANT is grounded in experiential learning theory and mirrors key elements of Kolb’s learning cycle [21], encouraging residents to reflect on concrete experiences (context, analyze), integrate expert guidance and personal reflections (teach), and apply new insights in subsequent cases (apply). By embedding reflection into routine practice, the framework aims to reduce blind procedural repetition and early reinforcement of errors. The final ‘Rant’ component intentionally humanizes feedback, promoting psychological safety, trust, and mentorship, which are key elements of surgical education [16]. Educators viewed this relational aspect as a strength and a means of fostering more meaningful professional connections with residents.

In Kolb's cycle, the four phases of the learning process are traditionally learner-mediated [21]. In practice, however, residents vary considerably in their capacity to convert a concrete operative, or simulation, experience into transferable knowledge,

and those with less developed self-appraisal may be least able to do so unsupported [16]. This variability is itself an argument for an educator-delivered scaffold where the stages of a learner's cycle are externalized through the support of a senior trainer, or near-peer facilitator, promoting a collaborative reflective experience, rather than on the resident alone [40,41]. The present project does not test this mechanism in learners, but it does establish that the educators on whom such a scaffold depends find cataRANT acceptable and time-efficient to apply in a live theatre setting.

Application to High-Volume Lists

Across several surgical specialties, including ear, nose & throat (ENT) [42], urology [38], and general surgery [43], there is a movement towards high-volume lists, or a high-intensity theatre (HIT) setup. Modeled on lean assembly principles and driven by the need to address surgical backlogs, these approaches are well-suited to services capable of standardizing theatre workflows [38]. Case selection is typically narrow; prioritizing routine and low-complexity procedures that can be reliably repeated. By minimizing turnover time, optimizing resource utilization, and standardizing protocols, high-volume lists enable surgical residents to accumulate greater caseloads without compromising theatre efficiency [15], resembling some elements of a Halstedian approach to surgical education [1].

High-volume practice does, however, create its own difficulties for more junior residents. Highly-efficient, compressed theatre lists may leave little room to operate at a learner's pace or provide exposure to more complex cases. Where theatre efficiency and case volume compete with surgical education, quality over quantity is arguably a more important variable to protect [10,14]. In procedural skill acquisition, more frequent expert feedback produces a smoother learning curve than repetition alone

[44]. As HIT models become increasingly embedded in the delivery of procedures, such as cataract surgery, hernia repair, and adenotonsillectomy, resident education must not be sacrificed for theatre efficiency [38,42,43]. To do so risks creating missed learning opportunities and producing a surgical workforce ill-equipped for careers that increasingly incorporate high-volume practice [6,15]. With an estimated post-case debriefing time of two minutes, the cataRANT is well-positioned for integration within HIT environments where case turnover typically spans 6–11 minutes [38,39].

Limitations and Future Directions

Due to the small number of eye hospitals sampled, this work may overestimate the utility of cataRANT and prove less generalizable to wider ophthalmology residency curricula. Trainee perspectives were deliberately not sought at this developmental stage as the design thinking framework prioritizes intended target users of an intervention, and this was deemed to be surgical educators. However, the lack of formal validation amongst ophthalmology residents makes its acceptability and impact amongst target learners unclear, which needs further examination. Theatre timings in a real-world workflow were not formally measured as an outcome of this study, and the impact on theatre workflows requires further examination.

The presence of two observers in theatre may have altered the behavior being measured, plausibly increasing rather than decreasing the frequency of debriefing, such that the 30% figure reported here may represent an optimistic estimate of routine practice. Transcript verification was performed by a single investigator, introducing the possibility of uncorrected transcription error. Finally, the investigators both designed and evaluated the tool, and the interviews were conducted face-to-face by a member of the design team. Social desirability may therefore have inflated the favorable

acceptability we observed. Independent evaluation by investigators with no stake in the framework would provide a more robust test of cataRANT acceptability.

Future work should explore resident perceptions, learner outcomes and the measured impact on theatre efficiency. Simulation is a natural extension, since cataRANT requires no equipment or scoring rubric and should be as deployable at the simulator as at the operating microscope; its value in unsupervised simulation practice is less certain, as the framework would revert to a learner-mediated cycle dependent on self-reflective capacity. Head-to-head comparison with other debrief frameworks, such as SHARP [24], would also be warranted.

Conclusion

High-quality feedback remains central to completing the educational loop, supporting learners in contextualizing and reflecting on concrete experience. The novel, brief cataRANT framework provided a structure that surgical educators found memorable, acceptable and quick to interpret, and that was valued for supporting an educator-trainee dialogue. The minimal infrastructure requirements suit the time constraints of high-volume cataract lists, where we observed educational debriefs to be infrequent and trainee-initiated. Validation among ophthalmology residents is the necessary next step, and our findings underline the wider need for feedback tools that are brief, humanistic, and memorable enough to be used in real-world practice.

STATEMENTS & DECLARATIONS

COMPETING INTERESTS

The authors declare no competing interests.

FUNDING

No funding was received for this work.

ETHICS APPROVAL

This was an educational evaluation with consenting ophthalmology attendings. No invasive procedures or collection of sensitive personal data was used. All qualitative methods were voluntary and anonymous. The educational improvement project was not deemed research by the Health Research Authority (National Health Service, United Kingdom).

CONSENT TO PARTICIPATE

Participants provided verbal consent for participation.

CONSENT TO PUBLISH

Participants provided verbal consent for anonymized quotations to be published.

DATA AVAILABILITY

Datasets generated during the current research study are available from the corresponding author upon request via email.

AUTHOR CONTRIBUTIONS

YSB and SM equally contributed to the conception and design of this project, collection of data and subsequent analysis, drafting of the manuscript, final approval of version to be published, and agreed to be accountable for the integrity of the academic work.

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538 **Table**

Table 1. Themes and supportive quotes addressing the open-ended feedback from ophthalmology attendings with respect to the 'cataRANT' tool.

Theme	Illustrative Quotes
Challenges of implementation in a surgical curriculum	"There's a need for this in current training, and yes you say it happens naturally, but there is no real structure. In its current form, feedback depends on very much who your trainer is and how busy the list is."
	"There is simply not enough time for an attending to analyze each video fully. Trainees can do a bit of homework and maybe seek formal feedback following a list, or specific sections of video need to be examined only. The homework does delay feedback though."
	"The curriculum is numbers driven with certain targets at each stage. It's difficult to say if this feedback tool can be used for someone with ample cataract cases under their belt and they are seeking to perfect each stage."
Timing of feedback	"I think this is fantastic, it underpins the power of storytelling. This tool is especially helpful if complications occurs where a trainee should try again to rectify any mistakes. This is helpful for

	looking at the cause of complications. This is also very memorable, and it fits some of the curricula changes occurring in UK ophthalmology."
	"The context element can be discussed prior to actual surgery to help trainees understand the complexity of the case. I like to think people do better when you've discussed the case beforehand so that they know what could potentially go wrong and what anticipated difficulties lie ahead."
	"The video analysis element can be enhanced by asking trainees to look at the videos individually on their own, and then allocate time later, like a cold debrief, to review the specific challenges."
Target audience (both receiving & delivering feedback)	"Not all trainees are receptive to feedback or enjoy receiving it, I think this tool definitely benefits trainees at the earlier stages of their careers. The structure will stick with trainees."
	"This provides great structure for cataract surgery, and it flows logically. There might be some clarity issue whether this is more for near-peer or senior-led, but otherwise the tool helps."
	"This is good for all stages of training, especially cases where your ego or confidence is bruised. This tool can act as a guide for even trainers who feel uncomfortable debriefing cases with senior trainees."

Surgical mentorship	“I think this tool can be used potentially beyond just the theatre setting and the principles can help coach other people in other educational elements, such as leadership.”
	“The main point is this section right here (rant) is to just have a section to chat. This makes all the difference as you dedicate some time for something informal, you know, to just make it more human again. We all know what theatre chat can be like.”
	“Even as a senior cataract trainer, I’d like to think I use a structured approach to debrief cases, but you often take it for granted, then you miss out on the opportunity to form a relationship with the trainee beyond a simply transactional one.”

Figure

Figure 1. The novel feedback tool – ‘cataRANT’ – encompasses the following five principles of the feedback: Context, Analyze, Teach, Apply, and ‘Rant’.

CataRANT

A feedback tool based on experiential learning theory for brief, humanistic, and structural feedback for cataract teaching lists.

Context	Set the tone for conversation Examine the background of the case
Analyse	Discuss specific points of strengths Discuss specific points of weakness Examine surgical video, if time allows
Teach	Organise the learning points Knowledge transfer (educator to trainee) Points for improvement, or technique variation
Apply	Apply the knowledge in new situation Consolidate learning in a new case
RANT	Reflect on overall theatre experience Normalise any negative experiences Reinforce any positive experiences Informal discussions (career, mentorship, or life outside surgery)