IMPROVING THE NON-TECHNICAL SKILLS OF SURGEONS IN THE OUTPATIENT CLINIC

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Discipline of Surgery, Faculty of Health and Medical Sciences

Submitted to the University of Adelaide

in January 2022

for the degree of

Master of Philosophy (Surgery)

I certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

I acknowledge the support I have received for my research through the provision of an Australian Government Research Training Program Scholarship.

Acknowledgements

This work was funded by the Avant Foundation Grant which is awarded to support initiatives that improve quality, safety and professionalism in practice.

This work was funded by The Hospital Research Foundation an independent, profit-for-purpose organisation.

A student scholarship was awarded by the Basil Hetzel Institute, with further support from the Discipline of Surgery, the University of Adelaide.

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Introduction

Surgical coaching is an emerging concept, despite the practice being well established in other high-performance fields such as aviation, entertainment, business, and sport. While surgeons have a regimented and well supported education system in place from when they enter University to gaining Fellowship, there are currently few opportunities for self-directed learning after this. Surgical colleges and organisations do offer Continuing Medical Education (CME), but this comprises of activities that are largely didactic experiences (such as conference attendance and participation).

Coaching aims to empower the user, or coachee, to be their own agent of change and is aligned with the adult learning theory. Programs for adult learning should reflect and directly apply to daily practice, be built to address individual needs, and ensure the participant engages actively. Experienced surgeons can act as peer-coaches to help surgeons identify areas of strength and areas for improvement. Coaches can help to create learning plans and specific goals to empower individual surgeons. Coaches can also review clinician-patient interactions. Using video recordings of real-life clinical practice that allow surgeons to see themselves in an unbiased manner and review their own skills objectively.

The importance of non-technical skills (NTS) in surgery is well understood, and NTS make up nine out of the ten core competencies as required by the Royal Australasian College of Surgeons. However, there are limited opportunities for Fellows to develop, reflect and improve NTS skills. These skills include communication, professionalism and clinical judgement and decision making.

This thesis aims to research and report on several clinical areas where coaching of non-technical skills could improve individual surgeon performance, sustain these improved skills, and eventually patient outcomes.

Chapter 1: Coaching to enhance qualified surgeons' non-technical skills: A systematic review

Granchi N, Ting YY, Foley KP, Reid JL, Vreugdenburg TD, Trochsler MI, Bruening MH, Maddern GJ. Coaching to enhance qualified surgeons’ non-technical skills: a systematic review. British Journal of Surgery. 2021 Oct;108(10):1154-61.

OXFORD

BJS, 2021, 108, 1154–1161
DOI: 10.1093/bjs/znab283
Advance Access Publication Date: 3 September 2021
Systematic Review

Coaching to enhance qualified surgeons' non-technical skills: a systematic review

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Abstract

Introduction: The lack of an effective continuing professional development programme for qualified surgeons, specifically one that enhances non-technical skills (NTS), is an issue receiving increased attention. Peer-based coaching, used in multiple professions, is a proposed method to deliver this. The aim of this study was to undertake a systematic review of the literature to summarize the quantity and quality of studies involving surgical coaching of NTS in qualified surgeons.

Methods: A systematic search of the literature was performed through MEDLINE, EMBASE, Cochrane Collaboration and PsychINFO. Studies were selected based on predefined inclusion and exclusion criteria. Data for the included studies was independently extracted by two reviewers and the quality of the studies evaluated using the Medical Education and Research Study Quality Instrument (MERSQI).

Results: Some 4319 articles were screened from which 19 met the inclusion criteria. Ten studies involved coaching of individual surgeons and nine looked at group coaching of surgeons as part of a team. Group coaching studies used non-surgeons as coaches, included objective assessment of NTS, and were of a higher quality (average MERSQI 13.58). Individual coaching studies focused on learner perception, used experienced surgeons as coaches and were of a lower quality (average MERSQI 11.58). Individual coaching did not show an objective improvement in NTS for qualified surgeons in any study.

Conclusion: Surgical coaching of qualified surgeons' NTS in a group setting was found to be effective. Coaching of individual surgeons revealed an overall positive learner perception but did not show an objective improvement in NTS for qualified surgeons.

Introduction

Modern surgical training has been largely successful in training surgeons to have adequate technical skills but has been criticized for competency assessment being based on inadequate metrics[1,2]. Furthermore, this model focuses on technical or operative skill development with little emphasis on developing non-technical (non-operative) skills (NTS)[3].

Approximately 10 per cent of hospital patients are unintentionally harmed by modern health care[4,5]. Patients are vulnerable when gaps in effective communication and teamwork are not addressed[6–8], with surgical patients a particularly at-risk group[5]. The work environment is perceived to be stressful[9] and failures of communication and awareness can lead to patient harm[10]. Thus NTS are critical to operative success and patient safety in the surgical domain[11].

Taking this into account, surgical training groups have updated the focus of training requirements, including NTS as part of required core competencies[12]. The Royal Australasian College of Surgeons (RACS), the surgical training body for Australia and New Zealand, lists nine competencies for becoming a proficient and competent surgeon. Technical expertise is only one of these competencies; the other eight are NTS.

After formal training ends, surgeons are required to undertake continuing medical education (CME). CME is often didactic, conference based, and arguably not engaging to the individual and their learning goals[13]. This is in stark contrast to how adults learn, as outlined in the tenets of adult education theory[14]. Adults should be active participants in their learning, which should build on individual needs, and be tailored to past experiences with direct applicability to their daily activities. These ideas form the basis of continuing professional development (CPD), a more effective and sophisticated form of post-qualification training[15]. It is vital that the CPD programme prioritizes the learning and refinement of NTS to reflect core competencies adequately.

Coaching is a concept aligned with adult education theory[16]. It is well established in the sport and entertainment industries, and has now become a key educational tool in business, education and medicine[17,18]. It is a method that is well suited to surgical training as it pairs mastery of skills through deliberate practice, with constructive feedback provided by an expert peer to mediate self-directed development[19,20]. Surgical coaching is increasingly seen as an educational model suitable for CPD.

Research into surgical coaching is a developing field with only three systematic reviews published to date. A systematic review

Received: February 17, 2021. **Accepted:** July 08, 2021

published in 2015 examined the coaching of all surgical skills to surgeons at any level of training[21]. Including 23 studies, the review found surgical coaching had a positive impact on surgical skills. The second systematic review, published in 2017, focused on randomized controlled trials (RCTs)[22]. Five RCTs were analysed and all showed improvements in skills and knowledge after coaching. A third systematic review[23] included 27 studies that focused on teaching new technical skills for surgeons as well as identifying barriers to coaching. All three reviews indicate that the current evidence for surgical coaching programmes is positive; however, two relate to trainees and qualified surgeons combined.

No systematic reviews have looked exclusively at the coaching of qualified surgeons in NTS. The purpose of this systematic review is to summarize the quantity and quality of studies involving surgical coaching of NTS in qualified surgeons.

Methods

This systematic review was registered prospectively through PROSPERO (registration number: CRD42018099549) and reported according to PRISMA guidelines[24].

Search strategy

A systematic literature search was performed on 23 October 2020 using four biomedical databases: MEDLINE, EMBASE, Cochrane Collaboration and PsychINFO. The search was conducted by three authors (N.G., Y.T., K.F.) and was restricted to peer-reviewed articles written in English and published after January 2000. Coaching has only recently been considered as a tool in surgical education, thus the authors agreed upon the date restriction because of the perceived lack of relevant studies prior to 2000. Searches were designed with input from a biomedical research librarian. Key search terms included Surgeons OR Specialties, Surgical AND Mentors/OR mentoring/OR peer group/OR (mentor* or coach* or peer* or clinical competence) AND Awareness/OR communication/OR *Nonverbal Communication/OR *Decision Making/OR *Leadership/OR (situational awareness or communication or nonverbal communication or decision making or leadership or non-technical skill* or nontechnical skill*). See *Table S1* for list of articles excluded at full-text review.

Definition of terms

The definition of coaching was in line with that of peer coaching[25]. As with previous research, coaching is defined as 'a form of inquiry-based learning characterised by collaboration between individuals or groups, and more accomplished peers'[26].

Non-technical skills (NTS) were defined as cognitive (for example decision making) and interpersonal (for example teamwork) skills that do not involve technical knowledge of an operative manoeuvre[27]. The five categories of surgeons' NTS include situational awareness, decision making, communication, teamwork, and leadership and management[28].

The Patient Intervention Comparison Outcome model was used to refine the objective (*Table 1*)[29].

Study selection

Studies were included that involved coaching of qualified surgeons (either individually or as part of a team) and where coaching formed all or part of the intervention, provided that the coaching fit the authors' definition. Studies were excluded where the intervention comprised a single debriefing occurring in a group setting. Non-English language studies, conference abstracts, review articles, editorials, and letters to the editor were also excluded.

Three authors (N.G., Y.T., K.F.) independently screened the title and abstract of all citations to identify articles for full-text review. Citations were screened using Rayyan, a web-based bibliographic management application[30]. Articles deemed to be relevant by title and abstract were then reviewed independently by both authors by full text. Any disagreements on inclusion were resolved via discussion. The reference lists of suitable studies were pearled to identify potential articles for inclusion.

Data extraction and synthesis

A pre-piloted form was used to extract data from the included studies. Three authors (N.G., Y.T., K.F.) extracted the data and populated the forms. Findings were then compared and any queries or disagreements on extracted data specifics were resolved by discussion. Fields on this form included: author, year published, country, study design, number of participants, number of qualified surgeons being coached, coaching target (individual or group), coach demographics, whether coaches received specific training, intervention characteristics (format, setting, duration, follow-up, focus), which NTS were coached, whether technical skills were also coached, how NTS were assessed, participant perception of coaching, outcomes assessed, main findings and risk of bias.

Basic narrative synthesis was performed on results[31]. Early in the analysis, it became obvious that the included articles could be separated into 'individual coaching' and 'group coaching'. Each group of studies shared similar characteristics including methodology, outcomes and conclusions. Thus, key findings are separated as such.

As part of the narrative synthesis, the authors identified five main groups of NTS that were coached and/or assessed. These comprised communication, teamwork (including cooperation), leadership (including management), situational awareness and decision making (including problem solving). Other NTS that were seen in individual coaching studies included teaching and stress management.

Reported outcomes were categorized based largely on Kirkpatrick's model of training evaluation[32,33]. This model is used widely in studies relating to medical education but is relatively novel in surgery. It is a flexible framework that can be applied to almost any training intervention. Its strength lies in differentiating between four distinct hierarchical levels of outcomes that are

Table 1 Patient Intervention Comparison Outcome model to describe systematic review aims[28]

Definition	Description
Population	Qualified surgeons (surgeons who have been awarded a fellowship of a surgical college or equivalent)
Intervention	Coaching to improve non-technical skills
Comparison	No coaching in non-technical skills
Outcome of interest	Improvement in surgeon non-technical skills

often complementary. Outcomes in previously published systematic reviews on surgical coaching were reported using this model and so it was the authors' decision to do the same, but with a modified version to focus on NTS (as outlined in Table 2).

Risk of bias assessment

Four authors (N.G., Y.T., K.F., J.R.) independently assessed each included study using the Medical Education Research Quality Instrument (MERSQI), a framework for assessing the quality of medical education literature[34]. Given the included studies encompassed a medical educational intervention, the MERSQI framework was considered appropriate for evaluating these studies. MERSQI includes 10 items that reflect six domains of study quality: design, sampling, type of data, validity of evaluation instrument, data analysis and outcomes, with a maximum possible score of 18. For those studies where a MERSQI item was not applicable, the authors adjusted the total MERSQI score based on the maximum points available. Any disagreements in grading were resolved by discussion between the authors. A higher MERSQI score indicates a more reliable and valid study.

Results

The initial search of the databases yielded a total of 4319 articles (Fig. 1). After duplicates were removed, 3451 articles remained. Once inclusion and exclusion criteria were applied, 99 articles were selected for full-text review (11 of which were from pearling). After this, a total of 19 was selected for final inclusion and analysis.

Study characteristics

Of the 19 included studies one was an RCT[35], two were non-randomized controlled trials[36,37] and 16 were observational studies[38–53] (Table S2). The observational studies can be further categorized into ten single-arm before–after studies[39,40,43,45–47,50–53], four descriptive studies[42,44,48,49], one retrospective cohort comparison study[41] and one two-group cross-sectional study[38].

Details of coaching

Ten studies involved coaching of individual surgeons. Of these studies, six included only qualified surgeons as the coaching target[37,41,42,48,49,53]. Two studies also involved coaching of trainee surgeons[38,44]. Two studies involved coaching a mix of surgeons and non-surgeons (but still working in a medical setting)[35,47]. Two studies delivered coaching both in group and individual settings[35,49], however as the focus was individual performance, the studies were categorized and analysed as individual coaching.

Along with coaching, four studies also included group-based didactic and interactive sessions[35,48–50] (Table S2). Six studies used qualified surgeons as coaches[37,38,41,42,44,53], including a study where the surgeon was trained in crew resource management (CRM), a technique developed by the aviation industry[54]. Two used a mix of qualified surgeons and non-surgeons[47,49], and two used non-surgical coaches[35,48]. The non-surgeons included various professions outlined in Table S2. In four of the individual coaching studies, the coaches underwent a structured training programme[38,42,47,53].

Nine studies involved group coaching. Six studies looked at surgical teams, with each team comprising multiple personnel[36,40,43,45,46,51]. Three looked at trauma teams, again comprising multiple personnel including surgeons[39,50,52]. One study[39] focused on a trauma surgical team, one[50] examined trauma teams seeing patients in the emergency department, and the other[52] looked at hospital workers involved in trauma. In all studies, surgeons represented the smallest numbers in each population, with trainee surgeons outnumbering qualified surgeons. Total number of qualified surgeons in each group coaching study can be seen in Table S2.

Five studies used qualified surgeons as coaches, but almost always as part of a coaching team involving non-surgical professionals[39,43,45,50,52]. Only one study used a single qualified surgeon as the coach[45]. In two studies the background of the coaching staff was not stated[36,51]. The other studies used coaches from the aviation industry who were well trained in the principles of CRM, a set of training procedures that has long been used in aviation to minimize the potential devastating effects of human error in high-risk situations[54]. The parallels to surgery and trauma have been noted and it is now being used in surgical team training in multiple centres worldwide[55,56]. Coaching is a key aspect of CRM, which is why these studies were included in the present review. Only one study implemented a training programme for coaches (Table S2).

Outcome parameters

The outcome levels on the Kirkpatrick scale of individual and group coaching studies were used (Fig. 2). Of note, five of the 10 individual coaching studies and five of the nine group coaching studies reported on more than one outcome level. However, only one level IV outcome was reported for individual coaching studies compared with five in the group coaching studies (Table S2).

Non-technical skills

The extent to which NTS were coached or assessed varied greatly between the studies, the greatest distinction being between studies looking at group and individual coaching. Where individual surgeons were the coaching target, generally only one or two NTS were coached. Only four studies[41,47,49,53] objectively assessed NTS, and, of those, two studies assessed baseline skills prior to the coaching intervention, one using a validated tool[53], the other,

Table 2 Modified version of Kirkpatrick's four levels of evaluation[31,32]

Level	Evaluation	Definition
I	Learner satisfaction	Evaluates how well received the intervention was, based on participants' perceptions, satisfaction and opinions
II	Learning outcomes	Assesses objective change in NTS level during the intervention among participants
III	Performance improvement	Assesses whether learning has influenced post-intervention behaviour and if a change in NTS level has been sustained
IV	Patient or health outcomes	Measures impact on patient outcomes as a result of participation in the intervention or continuing educational activity; difficult to assess

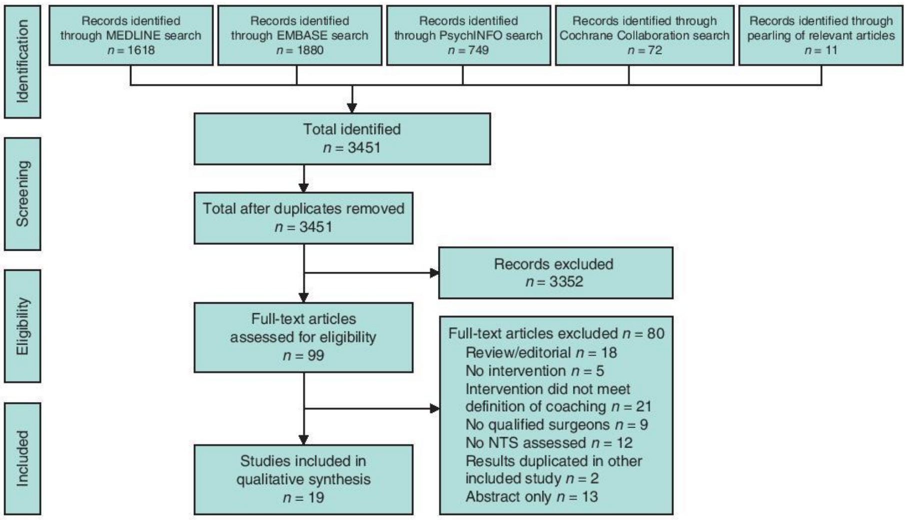

Fig. 1 PRISMA flow diagram

Full list of excluded articles and detailed reasons for exclusion provided in *Table S1*

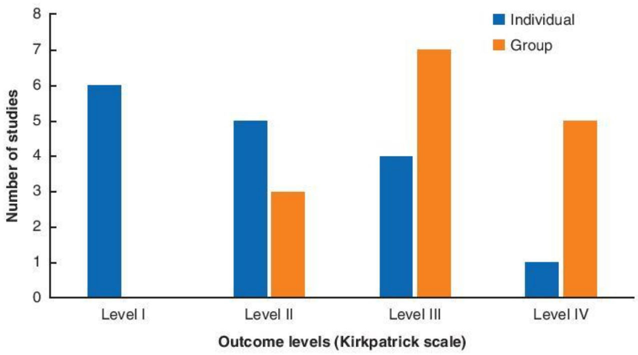

Fig. 2 Number of studies indicating reported outcome levels on the Kirkpatrick scale

a non-validated tool[49]. The purpose of this study was to develop a new coaching programme and, once implemented, the main outcome examined was learner perception. The other studies used validated tools, one[35] adapted from use within family medicine, and the other[47] developed at the study site by the research group. In these studies, coaching overall was effective but for the subgroup of qualified surgeons there was no statistically significant improvement in NTS. Five studies also looked at technical skills[38,42,44,49,53]. In four of these, the focus of coaching sessions was significantly skewed toward discussion of technical skills over NTS[38,42,44,49].

From review of the studies, the main finding is that the intervention of individual coaching did not show an objective improvement in NTS for qualified surgeons in any study. That said, surgeons have an overall positive perception towards the intervention. This is the lowest level of outcome (Kirkpatrick level I) that can be attributed to a medical-education study, but it provides a powerful base on which to build. The present review suggests that surgeons are receptive to the idea of coaching and find it beneficial in its current format. One key positive was the concept of a peer-coach, where surgeons appreciate advice and guidance from a figure for whom they have professional admiration and respect, and someone with whom they can share related experiences[57].

Multiple NTS were coached and assessed in each of the studies with a group focus, with only two assessing technical skills, glitch rate and compliance with WHO surgical safety checklist[36,46]. These were not operative technical skills but involved technical issues in the operating theatre that were not under human control. Seven studies used validated assessment tools which are summarized in *Table S3*[36,39,40,45,46,50,51]. The other two studies used non-validated tools including a checklist designed specifically for the study[43], and a pre-/post-test questionnaire to collect self-reported NTS levels[52]. All studies reported a statistically significant improvement in group assessment scores after a coaching intervention. One study conducted over three sites reported only one team having improved their NTS, the other two teams did not[40]. Despite these positive results there are no data in any of the included studies to suggest that surgeons, as a subgroup of the surgical team, improved in their NTS scores.

These results show that the intervention of group coaching demonstrated an objective improvement in NTS in almost all studies. A wide range of NTS were assessed in each study and were the primary focus of coaching in all studies. Given the large numbers of participants, there is a mixed educational approach being implemented in almost all the studies. Here, the traditional methods of didactic teaching (such as lectures and classroom-based teaching) are combined with concurrent feedback and debriefing. It has been shown that a multifaceted approach has led to significant performance improvement[58]. The specific coaching techniques in almost all the studies are based on the principles of CRM.

The quality of assessment of NTS attributed to each study is listed in *Table S3*.

Quality of studies

Studies were of variable quality with MERSQI scores ranging from a low of 10 to a high of 17 (*Table S2*). The average MERSQI score for all studies was 12.54 (median score 12.50). The main factors influencing scores were study design, sampling (including number of institutions and response rate), and level of outcomes assessed (according to Kirkpatrick level).

Individual coaching studies had an average MERSQI score of 11.58 (median score 10.75), compared with group coaching studies with an average MERSQI score of 13.58 (median score 13.50). As mentioned in the methodology, this does not dismiss the findings or conclusions of the individual coaching studies, but it does show that the studies examining group coaching are likely to reflect a stronger level of evidence and are thus more likely be published and used in programme design or policy making[34].

Discussion

The purpose of this study was to review systematically the available research to address the question of whether coaching of NTS is effective for qualified surgeons. The main finding is that there is limited evidence to suggest that individual coaching of surgeons improves NTS, but there is compelling evidence that NTS improve when qualified surgeons are coached in a group setting. Coaching appeared to be an effective form of surgical learning for qualified surgeons, and, in all studies, most surgeons reported it was a beneficial experience.

This emphasizes the need for additional exploration into coaching as a form of CPD for qualified surgeons. The three systematic reviews published[21–23] have been beneficial in showing the current state of surgical coaching research, whether it is effective, and what must be done to facilitate its implementation into mainstream surgical training.

Although results from the systematic reviews are encouraging, two did not specifically focus on qualified surgeons[21,22], a group for whom coaching is likely to be beneficial[59]. Qualified surgeons often work with a strong sense of autonomy and competency and it is unclear (from both surgeon perspective and objective measures) whether additional education would provide measurable improvements in skill[60].

Furthermore, most studies the reviews looked at involved coaching to improve technical skills. There is increasing evidence supporting the importance of NTS to both technical skill[61] and patient outcomes[62]. Previous research[63] has shown that even experienced surgeons are not immune to deficiencies in NTS, thus indicating the need to include them in surgical training at all levels and especially in surgical coaching programmes.

Group coaching objectively improved NTS in qualified surgeons and surgical teams. These coaching techniques almost always shared aspects of CRM, developed for use in flight training. Surgery and aviation require proficiency in similar NTS as both professions involve critical decision making in high-stress environments, where human error can have deleterious consequences. Given this, it is understandable that professionals from non-medical backgrounds were used as coaches in many of the studies. The fact that NTS improved in the studies suggests that these non-surgeon coaches can be effective and coaches should not be limited to surgeons only. The downside to this implementation is the cost and availability of specialized coaching staff. One method to circumvent this would be to recruit and train available staff as coaches, thus ensuring a sustainable in-house coaching programme; this has been used by many of the studies in this review, which included other members of the surgical team as part of the coaching team.

NTS were objectively assessed in all studies (level II outcomes and above). The main limitations on this finding are the significant biases associated with each study. Observer bias was prominent, with assessors of the teams (although being independent) knowing whether a team had undergone a coaching intervention simply based on the time course of the study. Rather than live assessment, video-based assessment with the date and time removed is a potential strategy to overcome this bias. The Hawthorne effect[64] is also worth considering. However, this effect would also be present in the observations before the test so the objective improvement in NTS stands. The nature of the studies meant that teams or operations could not be homogenized, especially in studies across multiple centres with large numbers of personnel.

Although the improvement in team NTS is obvious, it is still difficult to determine if individual surgeons, who make up the smallest proportion in a team, are the reason for the improvement, as subgroup analysis of objective NTS improvements did not occur in these studies. Some suggest that surgeons may have either no or negative impact[40,43]. One study indicated that the trauma teams were mainly led by surgical residents and so improvement could also be attributable to experience gained in addition to coaching[39]. One study[43] suggests that surgeons had differing perceptions of teamwork compared with those of other staff, with other staff groups rating their teamwork with surgeons lower than with any other group. Finally, in one study[40] the disparate results of each surgical team seemed partly related to the enthusiasm of the senior surgical leadership. Ultimately, future studies need to consider the assumed role of the qualified surgeon as the leader of the surgical team and assess their individual skill and influence on team performance objectively.

The review suggests that generally there is no statistically significant improvement in NTS of qualified surgeons after individual coaching. Most studies did not assess NTS, and of those that did, all but one looked at self-reported outcomes[53], such as how well surgeons felt they communicated after an intervention[47]. Two of the studies, demonstrated that both coach- and participant-rated skills were significantly higher when compared with objective assessment by study investigators using a coaching rubric[38,42]. Furthermore, when both technical and non-technical skills were assessed, the former were probably prioritized. This emphasizes the need for standardized assessment and coaching training, as well as highlighting the importance of dedicating time to addressing NTS during said training.

There were two studies that focused on developing a coaching programme, one that concentrated entirely on NTS[48], and the other aimed at giving NTS equal importance[49]. Both studies used non-surgeon coaches where the former was from a business and policy background, and the latter from a psychology background. Although the surgeons involved rated the programmes largely positive, some found certain aspects irrelevant to their surgical practice[48]. As surgeon coaches are likely to prioritize technical skills, using non-surgeon coaches to focus on NTS is a potential solution. This shows that coaches should be well informed about the needs of surgeons for coaching to be effective, either through experience or training.

Studies that focused on coaching of individual surgeons revealed an overall positive learner perception but highlighted a distinct lack of objective NTS assessment. This is further reflected in the lower average MERSQI scores of these studies. Future research must look at higher Kirkpatrick level outcomes.

The review is limited by the quality and material of the included studies, especially in the individual-coaching group. In this group, outcomes for four out of five studies that looked at the retention of skills (Kirkpatrick level III) were self-reported[37,41,47,48,53]. No studies evaluated the impact on patient outcomes or provided information on learner outcomes. Furthermore, the analysis was limited by the small number of studies and heterogeneity of the interventions and outcomes. These limitations were less apparent in the group coaching studies with the majority reporting on higher level outcomes and being largely homogeneous in their interventions and outcomes. That said, the number of studies was still too small to pool results, and so a narrative analysis of outcomes was used. Finally, the search was limited to a short time frame and the English language, and so may not have captured all studies.

In almost all the studies, participants volunteered to undergo coaching which is likely to result in selection bias. Thus, surgeons' self-criticism and reflection are difficult to assess, and there is evidence that surgeons who are overconfident in their own skills are less likely to perform at a high level or ask for feedback[65]. Thus it follows that surgeons who are most likely to benefit from coaching are less likely to participate voluntarily. Before an inclusive surgical coaching programme can be implemented or even made compulsory, further research is needed in obtaining coaching perceptions from large numbers of surgeons across multiple institutions and backgrounds.

This systematic review has revealed various qualities of evidence that suggest the usefulness of coaching interventions to both individual surgeons and those in a group setting and this should be practised in today's professional development standards. Practising surgeons have the greatest potential for benefit as they currently receive little instruction on technical and non-technical skills, once in surgical practice.

The lessons learned from this review should lead to design of more robust studies that can demonstrate objective improvements of higher outcome levels in relation to coaching of NTS for surgeons. Sceptical surgeons may then be encouraged to participate in larger trials, reducing selection bias and increasing ground-level support for coaching. Only then will it be possible to appreciate objectively the effect of coaching on surgical safety and improved patient outcomes.

Acknowledgements

The authors would like to acknowledge the work of Ms Wanda Pomeroy (B.Lib), Reference Librarian for the South Australian Health Library Service, who assisted with the development of the search strategy.

Funding

This study was funded by the Avant Foundation Grant to support initiatives that improve quality, safety and professionalism in practice.

Disclosure. The authors declare no conflict of interest.

Supplementary material

Supplementary material is available at *BJS* online.

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Chapter 2: Improving surgical excellence: A video-based pilot intervention in the outpatient clinic

Granchi N, Reid J, Foley K, Le Couteur A, Edwards S, Feo R, Trochsler M, Bruening M, Maddern G. Improving surgical excellence: A video-based pilot intervention in the outpatient clinic. Annals of Surgery *Submitted December 2021*.

Improving surgical excellence: A video-based pilot intervention in the outpatient clinic

Abstract

There are limited opportunities for surgeons to engage in active learning programs once they achieve Fellowship, especially for non-technical skills such as communication. This study aims to address this gap by evaluating a peer-based coaching program in non-technical skill using on video-recorded patient consultations from a routine outpatient clinic. Standard outpatient consultations between consultant surgeons and patients were video recorded. The surgeon viewed the videos with a peer-coach (senior surgeon) who helped identify areas of strength and areas for improvement. To test the effect of the coaching session, outpatient consultations were recorded roughly one month later. Pre and post coaching videos were assessed using the Maastricht History-Taking and Advice Scoring -Global Rating List (MAAS), a common tool for evaluating non-technical skills in clinicians. A total of 12 surgeons consented to participate. Coaching significantly improved MAAS scores (mean difference = -0.61; 95%CI[-0.88, -0.33]; p<0.0001). Surgeons were generally positive about the experience. All found the method of learning suitable, and most thought the process improved their skills. Most thought that coaching would improve patient outcomes and the majority thought they would participate in ongoing coaching as part of their employment. This supports the concept of surgical coaching as an effective tool to improve communication skills and the quality of the surgical consultation. The next step is to expand beyond a voluntary cohort and link surgical coaching to improved patient outcomes.

Introduction

Surgical coaching of non-technical skills is an emerging field. While professional coaching is an established practice in other high-performance fields such as sport, music, business and aviation, its value for surgeons has only recently been recognised[1,2]. Coaching is a process that aims to refine and improve existing skills through collaborative analysis and constructive feedback[2,3]. Peer-coaching involves colleagues, typically of similar experience, participating in a supportive interaction where the coach provides constructive feedback and encourages self-evaluation to achieve specific goals[3,4].

Surgical trainees are typically provided with structured learning programs throughout their training, but this largely ceases on being awarded their Fellowship[1,2,5]. Although continual professional development (CPD) is an ongoing requirement for consultant surgeons, there is little opportunity and support for active learning[6], an outcome that is not consistent with adult learning principles[7]. Moreover, despite evidence that didactic forms of CPD are less effective in modifying physician practice[8], the majority of current CPD for surgeons remains didactic in nature, consisting mostly of one-off events without follow-up[9]. Given that coaching allows participants to take an active role in their learning and identify strengths as well as areas for improvement as per adult learning theory, peer-based coaching has been proposed as a valuable form of CPD for practicing surgeons[9,10].

The majority of studies on coaching for fully qualified surgeons have centred on operative performance[5,11,12]. Studies that focus on coaching surgeons in non-technical skills in the outpatient clinic environment are largely absent from the literature. Additionally, learning opportunities for consultant surgeons skew towards procedural skills despite the emphasis placed by the Royal Australasian College of Surgeons on non-technical skills such as communication, situational awareness and decision making in their core competencies framework[13,14]. Although technical skills are central to a surgeon's practice, non-technical skills are vital for successful patient interaction; as evidenced by surgeons being more than twice as likely to receive patient complaints than their physician colleagues, with higher rates of dissatisfaction pertaining to interpersonal skills, communication and professional ethics[15]. The outpatient clinic is of particular importance as it is here that patients are informed about their condition and have the opportunity to seek clarification and make decisions about their healthcare. Nonetheless, there is limited published data on how to conduct effective surgical outpatient consultations.

This study aims to address this gap by evaluating a peer-based coaching program in non-technical skills for consultant surgeons based on video-recorded patient consultations from a routine outpatient clinic.

Methods

Setting & Participants

This interventional pilot study was conducted at The Queen Elizabeth Hospital (TQEH) in Adelaide, Australia. TQEH is a 300-bed tertiary centre, where roughly 18,000 surgical procedures are completed per year by approximately 100 surgeons. Surgeons were eligible to participate as a "coachee" if they were employed by TQEH as a surgical staff consultant, surgical visiting medical officer, or a surgical fellow (FRACS achieved or equivalent). Coachees were given an information sheet and were required to give written informed consent to participate. The purpose of the study was explained to all patients who were scheduled to see the enrolled consultant during the clinic session. Patients were allowed time to consider the study and provided with a consent form. If a patient did not consent, their consultation was not recorded. Four experienced surgeons were identified by the Investigators as suitable coaches as they had over 15 years' experience as a consultant surgeon and had worked in leadership positions within a tertiary setting. Each coach was assigned three coachees. Prior to study commencement, ethics approval was obtained from the Central Adelaide Local Health Network Human Research Ethics Committee (HREC/17/TQEH/284).

Coaching Intervention

Coachees met with their assigned coach to evaluate their self-perceived consultation skills. During this meeting, coachees outlined their goals for the program. These discussions were kept confidential from the study investigators and will not be published. An experienced human-factors psychologist (ALC) and lead author (NG) coordinated a training meeting for coaches with opportunities to discuss effective communication, imparting feedback, and goal-setting strategies.

Coaches and coachees met in a private space and allocated at least one hour per session. During the coaching session, coaches and coachees engaged in structured discussion according to the MAAS-Global List, and free-form conversation. The coach led the discussion whilst encouraging self-assessment by the coachee. To formalise the discussion and provide a learning direction, a 'Performance summary and action plan' was created by the coachee. Categories included exploration, emotions, information-giving, summarisations, structuring and empathy.

Data Collection

The methodology of the study intervention is outlined in Figure 1. Coachees treated surgical patients in their normal outpatient clinic sessions. Video and audio data were recorded for these sessions using SIM Capture technology. Two small cameras (roughly the size of a mobile phone) were set up in each clinic room, one facing the consultant and the other facing the patient. The cameras were visible but were placed in unobtrusive locations, away from participants' eyeline. The cameras only recorded interactions between the consultant and the patient while they were seated. Any physical examinations or requirements to undress occurred off-camera in a separate room. Following sessions, coaches reviewed the collected data in private. After this, coaches and coachees met in person and discussed strengths, weaknesses and areas for improvement using the video as an objective tool. This overall process was repeated three times.

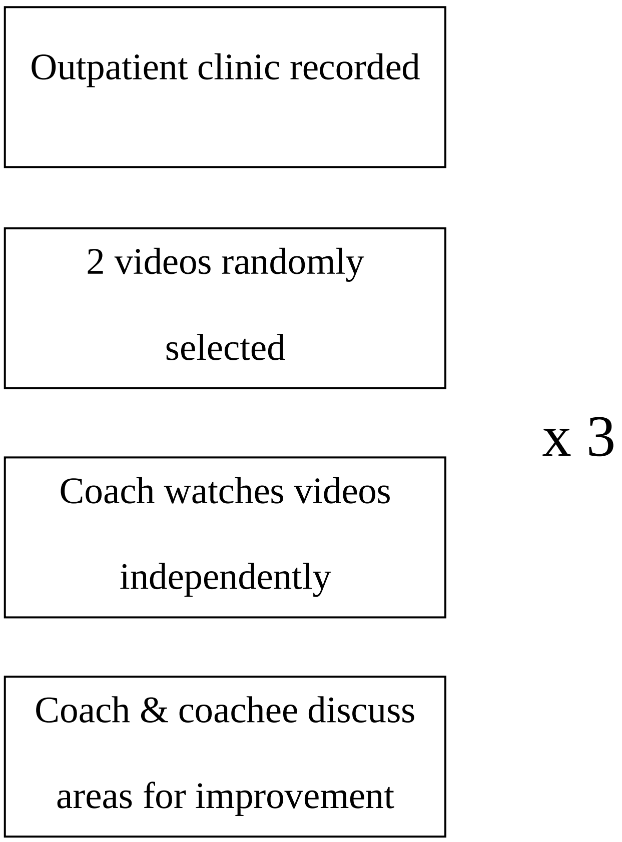

Figure 1: Clinic sessions were recorded, with coach and coachee meeting to discuss strengths and areas for improvement. The process occurred three times.

Video selection

Using the SPSS random number generator, 2 videos were selected from each recorded clinic session. This resulted in 6 videos for each coachee: 2 prior to any coaching, 2 after one session of coaching, 2 after two sessions of coaching, a total of 72 videos for the cohort. The videos were provided to the relevant coaches for review prior to coaching sessions. At the end of the invention, these selected videos were provided to the Assessors.

Outcomes and Assessment

The Maastricht History-Taking and Advice Scoring (MAAS)-Global Rating List[16] was employed as a verification tool to measure the coachees' progress over the duration of the study. It was selected as the most suitable test to rate clinician-patient interactions, because of its reliability and validation[16]. Briefly, the MAAS-Global combines 129 behavioural items and covers the entirety of a medical consultation[16]. The areas scored by MAAS-Global include: entry, overall orientation, exploration of the reasons for encounter, diagnostic plan, history taking, evaluation and giving information, management plan and evaluation of the consultation[16]. A score is awarded for an observed behaviour; no score is recorded if the behaviour is not present[16].

Four independent assessors reviewed the collected data and evaluated the effectiveness of the coaching intervention on non-technical skills using the Maastricht History-Taking and Advice Scoring List (MAAS). Two were consultant surgeons with training in non-technical and consulting skills and two were human-factor psychologists with experience in medical quality improvement. Each assessor scored all 72 videos. Assessors did not act as coaches during the intervention. Videos were blinded prior to review and assigned in a random order such that assessors were unaware of how many coaching sessions had occurred (0, 1 or 2). Coachees assessed themselves using MAAS scores pre and post intervention. Following completion of the intervention, coachees were asked to assess the program using a Likert-style questionnaire and free-flowing feedback.

Statistical Analysis

The statistical software used was SAS 9.4 (SAS Institute Inc., Cary, NC, USA). To investigate the efficacy of a peer-based coaching intervention for improvement of surgical outpatient consultations, a linear mixed-effects model was performed. Initially, an interaction model was performed, however, as the interaction was not significant (p value=0.3), a main effects model was used. The outcome was coach-assessed MAAS score and predictors were coaching session (baseline, 1 and 2) and video (1 and 2). A compound symmetry covariance structure was used to adjust for repeated measurements over time and a random effect for clustering on ID (2 videos) was also included. Assumptions of a linear regression were found to be upheld by inspection of scatter plots and histograms of residuals and predicted values.

To investigate accuracy of self-assessment of consulting skills (pre and post intervention), a linear mixed-effects model was performed. The outcome was MAAS score and the predictor was type (pre self-reported, post self-reported and at coaching 1/video 1). A variance components covariance structure was used to adjust for the random effect of clustering on ID (3 types of assessment for each surgeon). Assumptions of a linear regression were found to be upheld by inspection of scatter plots and histograms of residuals and predicted values.

Results

12 surgeons self-nominated to participate in the program (September 2018 – February 2019): ten general surgeons, one urologist and one orthopaedic surgeon. To ensure confidentiality, limited demographic data were collected. All surgeons were consultants or fellows. There was one female surgeon. A total of 182 patients consented to participate.

Each coachee was able to complete the full study protocol of three recorded clinic sessions, with each clinic session followed by a coaching discussion. The mean time between the first recorded clinic session and the second was 43 days (28-70), the mean time between the second recorded clinic session and the third was 37 days (21 – 68). Over the course of the intervention, individual MAAS-Global scores increased in ten coachees, remained the same for one and decreased for one (Figure 2). It was not possible to test whether individual coachees significantly improved after coaching due to insufficient power in the model. Linear regressions showed p values for all individual doctors to be >0.05.

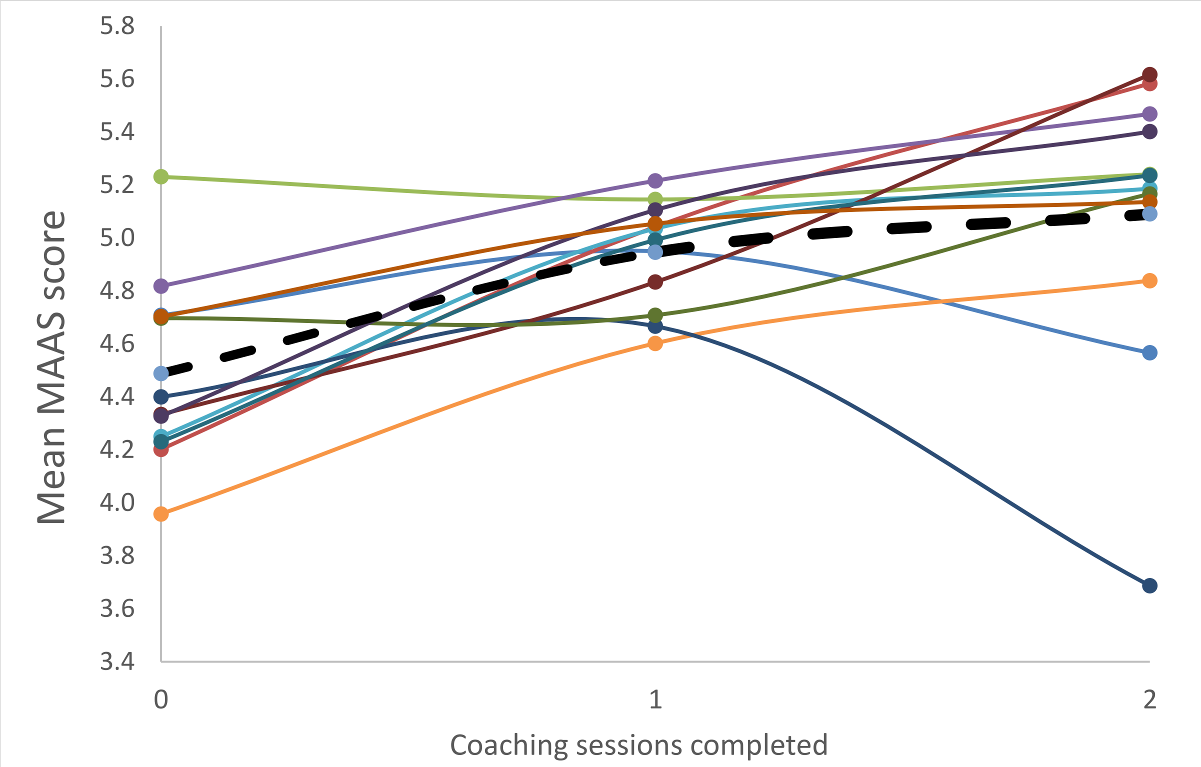

Figure 2: Most individual mean MAAS scores increased from baseline after the first, and then second coaching sessions (solid lines). The overall mean score is shown by the black dotted line.

However, the group demonstrated significant improvement after coaching sessions. A linear mixed-effects model showed a significant positive association between mean MAAS-Global scores and coaching, controlling for video and adjusting for repeated measurements over time (global p value = 0.0002). Mean scores improved from baseline vs post coaching session 1 (mean difference = -0.46; 95%CI: -0.74, -0.18; p = 0.0017) and baseline vs coaching session 2 (mean difference = -0.61; 95%CI: -0.88, -0.33; p<0.0001). There was no significant difference in mean MAAS between coaching sessions 1 and 2.

Coachees assessed their own skills at baseline and post-intervention and perceived an improvement in MAAS scores: 4.05 vs 4.71 (mean difference = 0.66; 95%CI:0.25, 1.07; p=0.0026). Assessor-assessed MAAS scores were significantly greater than baseline self-assessment: 4.47 vs 4.05 (mean difference=0.41; 95% CI: 0.00, 0.83; p=0.0484), but not post intervention self-assessment (p=0.2340). As mean baseline self-assessed scores were lower than assessor scores, it may suggest that surgeons were tougher on themselves than the assessors.

Intraclass correlation demonstrated fair agreement for MAAS scores between assessors (ICC = 0.57; 95% CI[-0.03, 0.86]) and when psychologist assessors were compared to surgeon assessors (0.46; 95% CI [-0.87, 0.84]). However, when the mean scores of individual assessors were compared against each other, there was a significant difference (mean [95%CI]; assessor 1, 4.32 [4.11, 4.53]; assessor 2, 3.86 [3.65, 4.07]; assessor 3, 4.74 [4.53, 4.95]; assessor 4, 2.68 [2.47, 2.89]; SE 0.1076; p<0.0001). On post-hoc analysis, the mean MAAS scores for assessors were all significantly different (mean difference [95%CI]; assessor 1 vs 2, 0.46 [0.28, 0.64], p<0.0001; assessor 1 vs 3, -0.42 [-0.60, -0.24], p<0.0001; assessor 1 vs 4, 1.64 [1.46, 1.82], p<0.0001; assessor 2 vs 3, -0.88 [-1.06, -0.70], p<0.0001; assessor 2 vs 4, 1.18 [1.00, 1.36], p<0.0001; assessor 3 vs 4, 2.06 [1.88, 2.24], p<0.0001). There was also a significant difference in mean MAAS scores between psychologist-assessors and surgeon-assessors, such that psychologist-assessor awarded lower scores (mean [95% CI] 3.50 [3.29, 3.71] vs 4.30 [4.09, 4.51]; mean difference = -0.80 [-1.00, -0.59]; p<0.0001).

Coachees were generally positive about the experience. All found the method of learning suitable, and 11/12 thought the process improved their skills (1 unsure). Nine coachees reported that the coaching would improve patient outcomes (3 unsure) and 9 said they would participate in ongoing coaching as part of their employment (3 unsure). No one reported feeling judged by their coach, and all said their views on their own performance had been acknowledged and discussed. All found their coach to be helpful in identifying strengths, and 11/12 found their coach helpful for identifying weakness (1 unsure). 10/12 reported that their coach had identified strategies for improvement (1 = unsure, 1 = disagreed). No coachee thought that the presence of video cameras had negatively affected the consultation, although there were mixed views on stress levels (agree = 2, unsure = 4, disagree = 6), and on whether their behaviour was altered (agree = 6, unsure = 2, disagree = 4). 10/12 disagreed with the statement that participating might suggest a competency issue, and 11/12 disagreed that this would compromise their leadership role. Only 1 coachee reported concerns about ramifications of a sub-optimal performance captured as part of the study. In response to the statement "I did not think I had deficiencies in my consulting skills", 3 agreed, 4 were unsure and 5 disagreed. There were mixed responses to whether coachees preferred to select their own coach, 2 agreed, 3 were unsure and 7 disagreed.

Discussion

In this study we sought to develop a peer-based coaching program focusing on surgeons' non-technical skills in the outpatient environment. Whereas previous studies investigating video-based coaching for surgeons[5,11,12] have focused on coaching in the operative setting, we chose to examine surgical coaching for outpatient clinic surgeon-patient interactions.

Our results demonstrate that the communication skills of consultant surgeons improved following a video-based peer-coaching program. A single coaching session sufficed to significantly improve mean MAAS scores for consultant surgeons in the outpatient clinic. However, measuring communication skills solely via MAAS scores is not without limitations, as various contextual factors in the doctor-patient interaction may not be captured by a binary scoring system[17].

A key factor in the success of the program is the opportunity to review video-footage of the outpatient consultation; this enables the coach to highlight areas for improvement to the coachee directly. It also allows the coachee to re-examine their practice at some distance and to avoid erroneous recall. This is beneficial as evidence indicates that doctors are not always the best judges of their own skills[18]. Research shows that poorer performing surgeons are more likely to overestimate their skills[18] which, in turn, may result in them being less likely to enrol in a voluntary coaching program. For this small subset, it is vital that coaching pivots from an optional exercise to a mandatory requirement, similar to basic life support, so that everyone is engaged. However, coaching is a process based on mutual respect and requires coachees to be active participants. As such, making coaching mandatory may not foster this process. Conversely, if coaching is voluntary, surgeons who are more self-critical and wanting to improve their practice may self-select to participate. Those less critical of their practice, but who may benefit more from coaching, may therefore be less likely to volunteer. Despite this, video-based coaching has been identified as a useful tool for surgeons who may have poor self-awareness of their own skills[18]. A limitation of any voluntary coaching study is the self-selecting population, as surgeons who elect to participate are typically already performing at a high level. Although the participants in our study showed overall improvement as a group, performance increments following a coaching intervention may have been more marked for poorer performing surgeons who, arguably, have more room to improve.

A further limitation of this study is the small sample size, due in part to the labour-intensive process of filming multiple outpatient clinic encounters. Similarly, other video-based coaching studies for consultant surgeons have comprised small numbers of participants, for example, the Wisconsin Surgical Coaching Program which had 8 coaches and 12 coachees[11].

While the ultimate goal of a peer-based coaching intervention for surgeons is to improve the quality of care delivered to patients, surgical coaching is in its infancy and there is a lack of robust data to demonstrate that coaching improves patient outcomes. Greenberg et al[19] sought to assess the impact of coaching on patient care and found that while operative times improved following a surgical coaching program, there was no significant improvement in risk-adjusted outcomes. We are hopeful that our pilot study will pave the way for larger-scale coaching interventions where effects on patient outcomes can be measured. Moreover, despite the success of coaching in other professions, the surgical discipline is yet to be convinced of the benefits for qualified surgeons. A recent survey conducted by this research group found that although surgeons generally support the idea of peer-based coaching and acknowledge its potential as a form of CPD, they wish to see more evidence of its effectiveness[20].

That all coachee surgeons in this study completed the coaching program in the set time-frame is promising for the expansion of the program to a wider cohort, including other institutions. Despite this, many participants commented via their feedback that it was difficult finding time to schedule face-to-face coaching sessions. This issue has also been identified in other surgical coaching studies[11,12], highlighting the need for hospital administrators to ensure time is quarantined for coaching sessions. A further solution, particularly in the COVID-19 era, is for coaching sessions to be held virtually.

Further work is required on who can and should be a coach, as it is important that outdated practices or poor habits are not passed on. The coaches in our study were invited to participate as they regularly demonstrated behaviours in line with surgical excellence. This selection was similar to that in other studies where coaches were peernominated[21]. Additionally, studies have provided coaches with a similar level of training such as the Wisconsin Surgical Coaching Program and the Michigan Bariatric Surgery Collaborative where coaches received a half day of training on peer coaching roles and expectations[21].

While the format of coaching requires a peer-to-peer relationship of equals, surveyed surgeons reported that they would be amenable to having a psychologist conduct coaching sessions for non-technical skills[20]. This has the potential benefit of freeing-up experienced surgeons whose availability may be limited. Furthermore, human-factor psychologists may offer effective communication strategies not previously considered by surgeons, and the ideal coach for non-technical skills may be either a peer-surgeon or a human factors expert[12]. In this study, psychologists awarded lower MAAS scores at baseline and post intervention when compared to surgeons. While the rate of improvement was similar and this did not affect the overall result, the reasoning behind this difference is an area for future work.

To our knowledge, this is the first study centred on coaching surgeons' non-technical skills in the outpatient environment with the goal of optimising the surgeon-patient interaction. It is important to note that we are not seeking a perfect, standardised outpatient consultation. The outpatient clinic can be a stressful and unpleasant experience for patients. Particularly when breaking bad news, it is essential that surgeons are able to communicate in an adaptive and intuitive way such that patients feel supported and empowered. There is no one-size-fits-all approach. The aim of coaching is to enable surgeons to refine and improve their non-technical skills so that patient experiences of consultations are as constructive and valuable as possible.

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Chapter 3: Peer coaching as a form of performance improvement: What surgeons really think.

Foley K, **Granchi N**, Reid J, Leopardi L, Maddern G. Peer Coaching as a Form of Performance Improvement: What Surgeons Really Think. Journal of Surgical Education. 2021 Mar 1;78(2):525-32.

Peer Coaching as a Form of Performance Improvement: What Surgeons Really Think

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OBJECTIVE: Coaching has been proposed as a potential form of continuing professional development (CPD) for surgeons. Our study aimed to elicit qualified surgeons' perceptions of peer coaching as a form of CPD and to determine the effect of demographic factors on surgeons' views.

METHODS: A cross-sectional paper survey was conducted across 2 South Australian metropolitan hospitals from November 2018 to January 2019. This comprised 5 demographic questions and 6 Likert items eliciting views on peer-based coaching and was distributed at departmental unit meetings to surgical consultants and fellows. Participation was voluntary and a definition of "peer-based coaching" was provided.

RESULTS: Hundred and eighteen surgeons of a possible 125 (94.4% response rate) from 8 surgical specialties completed the survey with 45.4% (n = 54) having received coaching since obtaining their fellowship. The majority of participants (72.9%, n = 86) reported consultant surgeons would benefit from peer coaching and that one-on-one coaching in an individual setting would be a useful CPD activity (73.7%, n = 87). Just over half the participants (53.4%, n = 63) felt that coaching by a nonsurgeon such as a psychologist would benefit their nonoperative skills. Many participants (61.8%, n = 73) felt more inclined to participate if CPD points were awarded. Despite the support in favor of coaching, a significant percentage of participants (45.8%, n = 54) wanted further evidence of its efficacy.

CONCLUSIONS: There is support amongst surgeons for peer coaching and its inclusion as a form of CPD, however, many require more evidence of its benefits, thus highlighting the need for ongoing research studies, consultation and pilot coaching programs. (J Surg Ed 78:525−532. © 2020 Association of Program Directors in Surgery. Published by Elsevier Inc. All rights reserved.)

KEY WORDS: peer-based coaching, continuing professional development, surgical coaching, survey

COMPETENCIES: Practice-Based Learning and Improvement, Medical Knowledge

INTRODUCTION

Coaching has long been viewed as a means of improving performance for professionals in the music, sporting and business arenas.[1,2] Its role in surgery, however, has largely been limited to coaching surgical trainees in operative skills.[3] Studies investigating the benefits of coaching for surgical trainees have shown high degrees of learner satisfaction and improvements in skill and knowledge.[4] Consequently, coaching (in particular, peer-based coaching) has been proposed as an alternative method of ongoing professional development for doctors and its role in continuing surgical development is emerging.[1] Peer coaching is a distinctive type of coaching where peers, often at a similar level of knowledge, engage in a noncompetitive relationship where specific goals are established and achieved through self-evaluation, coach feedback and support.[5]

Continuing professional development (CPD) is a self-directed approach to continuing education.[6] It is both

Sources of funding for research: This study was funded in-kind by The Hospital Research Foundation/ The Queen Elizabeth Hospital Department Vacation Research Scholarship 2018/2019.

Previous communication to a society or meeting: This research was presented at the Royal Australasian College of Surgeons 88th Annual Scientific Congress, Bangkok, Thailand on May 7 2019.

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1931-7204/$30.00
https://doi.org/10.1016/j.jsurg.2020.08.005

an essential component of being a medical practitioner as well as a core component of membership of the Royal Australasian College of Surgeons.[6,7] The purpose of CPD is for doctors to maintain their knowledge and skills in order to ensure safe and competent practice and, ultimately, to improve the quality of healthcare delivered to the patient. Despite its importance, many forms of CPD for qualified surgeons are didactic in nature, occur episodically, and are not necessarily tailored to the learner's needs. Furthermore, studies demonstrate that didactic forms of CPD tend not to alter practice whereas interactive forms of CPD are more likely to result in changes to physician behavior.[8] Additionally, considering the current CPD point system in Australia, there is often little incentive for surgeons to implement what they have gained from their CPD.[6] Given that interactive forms of CPD have been shown to be more effective and that, by definition, coaching should be an engaging and interactive process, coaching has significant potential as a form of continuing performance improvement for fully qualified surgeons and should not be limited solely to trainees.[6,9]

Coaching offers an ideal active form of improvement, as it involves self-reflection via facilitated analysis, feedback and debriefing.[9] Studies examining the effect of peer coaching interventions for performance improvement of qualified surgeons have demonstrated it to be beneficial.[10,11] Palter et al. found that those surgeons who underwent peer coaching to learn an advanced laparoscopic skill outperformed surgeons allocated to a conventional method of training.[10]

To date, studies that have examined consultant surgeons' views on coaching as a form of continuous learning have been small-scale studies where views were sought during or after participation in a coaching intervention.[11,12] The only study to our knowledge that has focused solely on exploring qualified surgeons' perceptions of peer-based coaching was a qualitative interview-based survey of 14 consultant surgeons conducted by Mutabdzic et al.[13] Our study sought to expand on this work by eliciting the views of the majority of surgeons across 2 tertiary hospitals and from a broad range of surgical specialties, through collecting quantitative data.

AIMS

By obtaining the views of consultant surgeons, we aimed to investigate surgeons' perceptions of peer-based coaching as a form of CPD and to explore perceived barriers to utilising coaching in this way. A secondary objective was to examine whether surgeons' views are influenced by demographic factors such as exposure to coaching, age, gender, and years since obtaining fellowship.

METHODS

Study Design

The authors generated a list of approximately 20 proposed Likert item questions to assess surgeons' perceptions of coaching. These proposed Likert items were then distributed to several surgical peers for opinion; based on both peer feedback and the assessment of the authors, 6 of the most pertinent Likert item questions were selected for the final cross-sectional survey, in addition to 5 demographic questions. Ethics approval was subsequently obtained from the Central Adelaide Local Health Network Human Research Ethics Committee. Following this, the paper-based survey was distributed to surgical consultants and fellows at unit meetings and at other opportune times from November 2018 to January 2019 across 2 tertiary hospitals in the same local health network.

Using hospital staffing rosters, we estimated that there were approximately 160 surgical consultants and fellows employed at the 2 hospitals, The Royal Adelaide Hospital and The Queen Elizabeth Hospital, and attempted to contact each of them. To be eligible to participate, surgeons were required to have obtained fellowship from a college of surgeons and to have provided informed consent. To afford a clear perception of what peer-based coaching constitutes, we decided on the following definition from an analysis of the literature:

> "*Peer-based coaching is based upon a partnership between two surgeons, in which one facilitates the other's pursuit of self-identified goals through collaborative analysis, peer-support and constructive feedback. Coaching emphasises the development and refinement of the learner's existing skills and their empowerment to make change to practice*".

Participants were also given a verbal explanation as to how peer-based coaching differs from mentoring and teaching.

Questions were asked regarding the following general demographics: age, gender, specialty, and the year of obtaining fellowship. A further question elicited whether respondents had participated in any coaching since obtaining their fellowship and, if so, to provide details. The 5-point Likert item questions asked participants to select the option which best described how they felt about the statements detailed in Table 1 on the following scale: strongly agree, agree, undecided, disagree, or strongly disagree. An additional set of questions required participants to select whether coaching would be beneficial for technical skills only, nonoperative skills only or both technical and nonoperative skills. Space was provided at the end of the survey for additional comments or thoughts.

TABLE 1. Likert Scale Statements

Q1	*Consultant surgeons would benefit from coaching*
Q2	*I would only find coaching beneficial if it were from a more experienced surgeon and of my specialty who was more experienced than me, and from my specialty*
Q3	*Coaching by a nonsurgeon such as a psychologist would be beneficial to my nonoperative skills*
Q4	*One-on-one coaching in an individual setting would be a useful form of CPD*
Q5	*If CPD points were awarded for coaching, I would be more likely to participate*
Q6	*I need to see more evidence of the usefulness of coaching to be convinced this is worthwhile*

TABLE 2. Participant Specialty

Specialty	Number Surveyed
Cardiothoracic surgery	4
General surgery	42
Neurosurgery	7
Oral maxillofacial surgery	1
Orthopaedic surgery	21
Otolaryngology	9
Plastic and reconstructive surgery	13
Urology	11
Vascular surgery	7
Not stated	3
Total	**118**

Statistical Analysis

Responses were tabulated and collated in an Excel (Microsoft, Redmond, Washington) spreadsheet. Descriptive statistics were utilised with data expressed as percentages, and weighted averages calculated for questions answered on the 5-point Likert scale. Participant age was divided into 2 categories, those aged 50 years or younger and those older than 50. The number of years since obtaining fellowship was divided into 3 categories: fellowship obtained between the years 2010 to 2018, 2000 to 2009, and prior to 2000.

RESULTS

One hundred and twenty-five surgeons were able to be contacted. Two surgeons declined. Four surgeons agreed to participate and were provided with the survey, but did not return it despite being reminded. One surgeon completed the demographic data but not the actual survey, and consequently was not included. Thus, a total number of 118 surgeons completed the survey and are included in these analyses, representing a 94.4% completion rate.

Demographics

The median age was 47 years, with the majority of participants aged 50 years or younger (60.2%, n = 71). A total of 35.6% were older than 50 years (n = 42) while 4.2% did not state their age (n = 5). Around 84.7% (n = 100) of participants identified as male and 13.6% (n = 16) identified as female, with 2 participants choosing not to state their gender. The median year that fellowship was obtained was 2008 with almost half of participants obtaining their fellowship between 2010 and 2018 (43.2%, n = 51) and approximately a quarter between 2000 and 2009 (25.4%, n = 30) and a further quarter prior to 2000 (27.1%, n = 32). The largest specialty reported was general surgeons (35.6%, n = 42), followed by orthopedic surgeons (17.8%, n = 21). The breakdown of specialties, as detailed in Table 2 constitutes a representative sample of the different surgical specialties operating across both institutions since it included surgeons from 8 of the 9 surgical specialties listed on the Royal Australasian College of Surgeons website. The only surgical specialty not surveyed was pediatric surgery, as it is not performed at either hospital involved in the study.

Exposure to Coaching

The majority (52.5%, n = 62) reported not having received coaching since obtaining their fellowship, whilst 44.9% (n = 53) reported receiving coaching in some form and 2.5% (n = 3) did not respond to this question. Many of those who reported having received coaching post fellowship described this as being part of a skills training course. Participants also reported receiving coaching from peers or mentors.

Perceptions of and Attitudes Toward Coaching

A total of 72.9% (n = 86) of respondents felt that consultant surgeons would benefit from coaching. One quarter of participants (24.6%, n = 29) were still undecided as to whether coaching would be beneficial for consultant surgeons and 2.5% (n = 3) did not believe coaching would provide any benefit (Fig. 1 graphs).

Opinions were divided regarding the statement "I would only find coaching beneficial if it were from a surgeon who was more experienced than me, and from my specialty". A total of 39.8% (n = 47) agreed or strongly agreed with this sentiment and 40.7% (n = 48) disagreed or strongly disagreed. A total of 19.5% (n = 23) of respondents were undecided. Several surgeons noted in the comments section that having a coach who was "less experienced" may in fact be beneficial as this could bring new

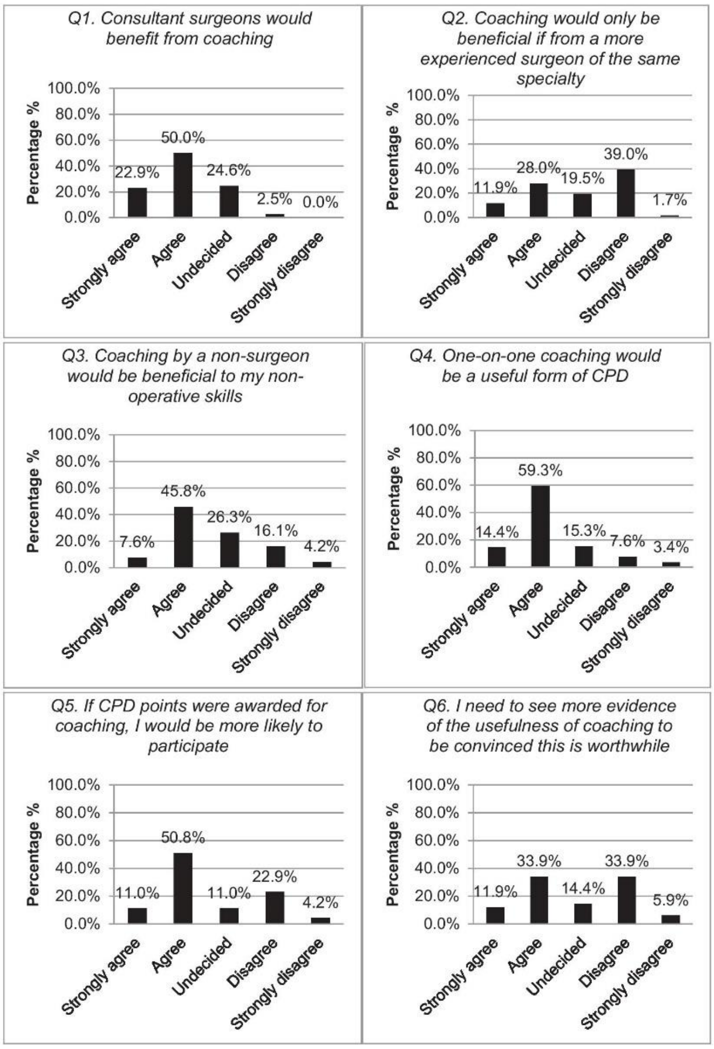

FIGURE 1. Perceptions of and attitudes toward coaching.

perspectives or ideas to the more experienced surgeons' practice. Some participants who disagreed with this statement, elaborated that it was not necessary for the coach to be from the same specialty as the coachee, since this, in fact, could provide a more constructive and enlightening experience.

The majority of surgeons felt that coaching by a nonsurgeon such as a psychologist could be beneficial to their nontechnical skills (53.4%, n = 63). A total of 24 surgeons (20.3%) did not agree that coaching by a nonsurgeon would benefit their nontechnical skills and 31 (26.3%) were undecided.

those who had previously experienced coaching were undecided about the benefits. There were no marked disparities in positive responses from those who had received coaching versus those who had not, with respect to the following statements: coaching by an experienced surgeon of the same specialty (41.5%, n = 22 vs 38.7%, n = 24), coaching by a nonsurgeon (52.8% n = 28 vs. 53.2% n = 33) and, lastly, individual coaching for CPD (74.1%, n = 40 vs 74.2%, n = 46). A greater proportion of surgeons who had received prior coaching agreed that they would be more likely to participate in coaching if CPD points were awarded (66.7%, n = 36) in comparison with those with no prior coaching (58.1%, n = 36).

DISCUSSION

Our results demonstrate that there is overall support amongst qualified surgeons across our 2 hospitals for coaching as a form of CPD. This is in line with other studies measuring participant satisfaction post participation in a coaching program. As mentioned earlier, Palter et al. found that surgeons allocated to a peer coaching group reported greater learner satisfaction than those assigned to a conventional training group.[9] Similarly, Hu et al. reported that participants partaking in their study's video-based peer coaching sessions "universally endorsed the sessions as educationally invaluable."[10] In contrast to both our findings and Hu et al.'s findings, Mutabdzic et al. found that there was a high degree of initial resistance to coaching by consultant surgeons.[12]

The discrepancy in response to the Likert-item "I would only find coaching beneficial if it were from a surgeon who was more experienced than me, and from my specialty" suggests that surgeons would benefit from choosing their own coach, thus making it a more personal and empowering experience for the coachee. In their scoping review, Schwellnus and Carnaghan found that participants are satisfied when the coach is a more experienced medical practitioner or from a different healthcare profession, but nonetheless of the same seniority.[14] These findings are also endorsed by Greenberg and Klingensmith who highlight the importance of building trust and rapport between the coach and coachee.[9]

Coaching risks placing surgeons, a group of highly trained professionals, in a vulnerable position, as a core component of coaching involves self-evaluation and reflection on one's own practice. Byrnes et al found that some surgeons participating in their surgical coaching program felt that such participation had the potential to destabilize their identity as a competent surgeon.[12] The pressure to meet both societal and personal expectations of a surgeon may cause practitioners to avoid placing themselves in a potentially vulnerable position when being coached.[12] Furthermore, participation must not be used as a form of remediation. This finding is echoed by other studies examining surgeons' views of coaching as a form of CPD.[13,14] Mutabzic et al. elicited concern amongst some surgeons that participating in coaching may risk portraying an image of "incompetence", particularly if feedback were given in front of colleagues.[13] Consequently, it is important that surgeons have input with regards to the peer coaching process and that this is done in a sensitive and confidential manner. Additionally, there is the bias that surgeons who may require additional support or supervision, and who would arguably benefit the most from participating in an intervention such as coaching, are potentially less likely to engage in a voluntary coaching program.

Despite being provided with a clear definition of coaching and how it is distinct from mentoring, teaching, and training, participants often conflated coaching with similar endeavors. This may account for the large proportion of "undecided" responses and is possibly due to the discrepancies in the way the term coaching is used colloquially. Lovell found that some studies use the term "coaching" interchangeably with teaching and mentoring, despite it being a distinct entity, albeit with some overlap.[15] The features of coaching that distinguish it from teaching are that the focus is not on the transmission of knowledge but rather providing real-time feedback about observed behavior, and challenging the individual to facilitate development of new behaviors.[15] It differs from mentoring in that the focus of the interaction is not counseling or advising, however, these can be lesser features of coaching.[15] Consequently, the lines between teaching, mentoring, and coaching are often blurred. This highlights the importance of providing education and examples of what coaching entails in order to avoid misconceptions and confusion.

The majority of participants agreed that coaching by a nonsurgeon peer, such as a psychologist, would be beneficial. This is supported by Stefanidis et al. who concluded that the ideal coach for nontechnical skills may be someone with a human-factors background, rather than a peer surgeon.[16] In the comments section, several participants reiterated that the coach does not necessarily need to be more experienced than the coachee and that receiving coaching from a more junior colleague or a surgeon from a different specialty may in fact be more beneficial, as it provides an alternate perspective.

The strength of our study is its originality. While other studies have obtained surgeons' views post participation in specific coaching interventions, or have performed interviews with a small number of surgeons to obtain their opinions, our study sought to fill the literature gap by surveying a large number of surgeons, many of whom had no previous exposure to coaching. Moreover, to our knowledge, there is no other study which has examined the effect of demographic factors on surgeons' perception of peer-based coaching. In line with our hypothesis was the trend that more recently qualified surgeons viewed coaching more favorably as a form of CPD than those who had obtained their fellowship earlier. A potential explanation could be the greater emphasis on self-reflection in modern surgical training or that recently qualified consultants are more likely to explore ways to improve and refine their skills in order to establish themselves in their field and prove their competence.

An additional strength of this study was the excellent response rate, most likely owing to the survey being distributed in person at unit meetings rather than via email or online. Studies examining the likelihood of physicians responding to a survey have found that paper surveys have a better response rate than those administered electronically.[17-19] Furthermore, this approach allowed us to elicit a range of opinions, thereby overcoming the potential bias of only receiving responses from those who either strongly supported or opposed coaching. A further value of this study is that it can be readily replicated to assess preferences of surgeons working at other hospitals.

A limitation of the study is that it was conducted across only 2 hospitals in the same local health network and consequently excluded the views of surgeons operating at other institutions or those solely employed in private practice. Secondly, the study questions were not validated as there were no prevalidation survey tools available. A third limitation is the brevity of the survey. Additional questions and a qualitative component would certainly have elicited further information, however, we sought to obtain the views of as many surgeons as possible in the interest of diversity and felt that a shorter survey would achieve this. We acknowledge also that only a small number of female surgeons were surveyed; however, this is expected, given the underrepresentation of women in the surgical workforce.[20]

Owing to the small number of participants from particular specialties and the low number of female surgeons overall, it was difficult to conclude our secondary objectives as to whether perceptions were influenced by specialty or by gender. In order to establish this, a much larger population would need to be surveyed, either on a national or international level. As such, a limitation of our study is that, despite the good response rate, our sample was too small to determine statistical significance of demographic factors and could only demonstrate trends associated with these.

CONCLUSIONS AND RECOMMENDATIONS

Our results show that surgeons support coaching, especially if they have previously experienced coaching and are amenable to choosing their own coach. These results can be utilised in guiding the implementation of subsequent studies on peer-based coaching and the development of pilot coaching programs for continuing surgical education and training. Future directions could constitute distributing the survey to other hospitals and health networks to validate whether there is a difference of opinion. In this way, differing perceptions could be further analyzed and reasons for this elicited.

ACKNOWLEDGMENTS

Dr Katarina Foley was the recipient of The Hospital Research Foundation/ The Queen Elizabeth Hospital Department Vacation Research Scholarship 2018/2019, which provides both financial support to the medical student undertaking vacation research and to the department in which they undertake the research, in this case, the Department of Surgery at The Queen Elizabeth Hospital.

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Chapter 4: The impact of computers on the surgical consultation

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doi: 10.1111/ans.17066

The impact of computers on the surgical consultation

The modern incorporation of electronic medical systems into the hospital environment shifts the dynamics of the patient–doctor interaction to include a third party—the computer. Current literature is limited regarding how patients perceive their hospital experience as such technology is introduced. This study aims to understand how patients are impacted by the presence of computers during surgical outpatient consultations.

Methods

Post-consultation surgical patients were approached in the Outpatient Department of The Queen Elizabeth Hospital in August 2019. They were asked five Likert-style questions which were delivered verbally to improve the likelihood of receiving a patient response. To prevent duplicate responses, patients confirmed they were not previously approached with the same survey. Additional patient feedback was recorded. No information about the patient, their consultant, their medical problem or any other identifiable factors was recorded.

Responses to each question were assigned to levels on a 5-point Likert scale, the tally of each level converted to percentages of the total response and represented as bar graphs (Fig. 1). The scoring categories were 1 'not at all', 2 'slightly', 3 'moderately', 4 'a lot' and 5 'extremely'. Mean and standard deviation (SD) were

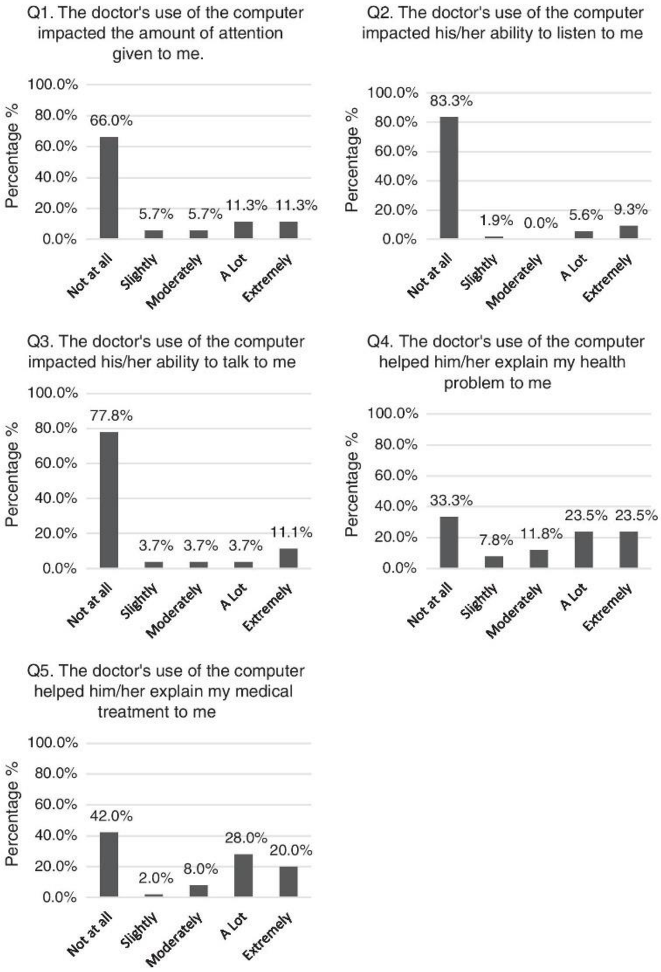

Fig. 1. Participant responses to Likert-style questions on doctor's computer use.

generated to determine the prevailing patient opinion by matching values to the closest level on the Likert scale.

This project was approved by the Central Adelaide Local Health Network Human Research Ethics Committee (Q20190306).

Results

Sixty-seven patients were approached to participate. Ten patients declined; three patients provided qualitative feedback only. Out of 54 responders, five provided partial responses, which are included in the analysis where possible, along with 49 complete responses.

Overall, patients expressed that use of computers 'slightly' impacts the attention doctors provide (mean = 1.96, SD = 1.49), their ability to listen (mean = 1.56, SD = 1.31) and their ability to talk (mean = 1.67, SD = 1.37). However, over two-thirds of patients felt computer use had no impact on doctor–patient communication, answering 'not at all' to questions regarding the doctor's attention (66.0%, n = 35), listening (83.3%, n = 45) and talking (77.8%, n = 42).

Computer use has 'moderate' benefit in helping consultants explain health illness (mean = 2.96, SD = 1.62) and medical treatment (mean = 2.82, SD = 1.67). There is a greater spread of patient responses—nearly half of the patients expressed that computers had 'a lot' or 'extremely' benefitted the explanation of health illness (47.0%, $n = 24$) and treatment (48.0%, $n = 24$), while over one-third of patients felt there was no benefit to the explanation of health illness (33.3%, $n = 17$) or treatment (42.0%, $n = 21$).

Twenty-one participants provided additional comments in the survey, in which 10 comments stated that computers were not used during the consult. Other relevant positive feedback includes 'used [computer] efficiently to arrange next appointment and check past records' and 'they have to use [computer] for my treatment'. Negative feedback regarding computers were 'printer issues slowed them [consultant]' and '[doctor] normally always on computer'.

Discussion

The results show that most patients do not perceive computer use during consults to have substantial impact on the doctor's interaction with them. Patients generally acknowledge the electronic medical record as useful and necessary in health care; thus, they regard it as part of the normal consultation process.[1] Consistent with these findings, Eberts and Capurro report patients mostly agreeing that the doctor maintains 'good personal contact while using the computer',[2] potentially explained by the importance of an ongoing relationship with the physician as the key to good patient–doctor communication.[3] Furthermore, Wali et al. found significant improvements in both the doctor's attention and active listening upon the introduction of EMR.[4]

Patients were more likely to report that computers impact doctors' attention compared to their talking and listening abilities, possibly an indication that doctors can multitask, that is, converse with patients and use the computer, but cannot divert eye gaze from the screen when navigating it, thus compromising attention to the patient.

Computer use benefits the doctor's explanation of their illness and treatment, which was similar to Wali et al.'s results.[4] A greater range in response reflects the flexibility of computer use during a consultation. Technological demand differs for an initial patient assessment compared to investigations review or medication prescription. For example, a patient who commented they 'knew [their] problem [and] treatment' would be less benefitted by additional explanation using computers.

The strength of this study lies in its uniqueness. No previous study in the past decade directly investigated the patients' perception of how computer use affects their hospital experience in Australia.

This study is limited by the lack of standardised framework to assess patient perception in such context, reducing comparability to current literature. The survey, being delivery in verbal format, allows potential response bias. The study is limited to outpatients from one major hospital and by a small sample size.

The patients perceive computers to have little impact on patient–doctor communication and may benefit their hospital experience. More work is needed to fully optimise the presence of the computer in the consultation; however, patients are positive about the new paradigm.

Author contributions

Dangyi Peng: Formal analysis; writing-original draft. **Nicholas Edwardes:** Data curation; methodology; writing-review & editing. **Nelson Granchi:** Conceptualization; methodology; writing-review & editing. **Jessica Reid:** Conceptualization; methodology; project administration; supervision; writing-review & editing. **Guy Maddern:** Conceptualization; methodology; resources; supervision; writing-review & editing.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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doi: 10.1111/ans.17008

Chapter 5: The doctor will see you now: Eye gaze, conversation and patient engagement in the surgical outpatient clinic. An Australian observational cross-sectional study

Ting YY, Reid JL, Treloar E, Lee WS, Tee JY, Cong WJ, Peng D, Edwards S, Ey J, Edwardes N, **Granchi N**, Maddern G. The doctor will see you now: Eye gaze, conversation and patient engagement in the surgical outpatient clinic. An Australian observational cross-sectional study. ANZ Journal of Surgery. 2021 91(11) 2376-2381

Royal Australasian College of Surgeons

The doctor will see you now: eye gaze, conversation and patient engagement in the surgical outpatient clinic. An Australian observational cross-sectional study

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Key words
mutual eye gaze, patient engagement, surgical outpatient.

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Funding information
This study was funded by the Avant Foundation Grant to support initiatives that improve quality, safety and professionalism in practice.

Accepted for publication 10 August 2021.

doi: 10.1111/ans.17163

Abstract

Background: Surgical outpatient consultations are demanding for the surgeon and patients without a definite formula for success. Various factors have been identified regarding factors that influence patient satisfaction and engagement. We aimed to examine the modern-day surgical outpatient consultation and report on these factors.
Methods: An observational cross-sectional study was performed by reviewing video recordings of 182 surgical consultations by 12 surgeons at The Queen Elizabeth Hospital, South Australia, Australia.
Results: The mean consultation time was 12.3 min, with pre-surgical consultations being the longest. There were 107 consultations for benign conditions (58%). Proportionally, the consultant spoke most (51.9% of total consultation time), followed by the patient (19.5%) and then companion (8.2%). Forty-eight (26.4%) patients brought a companion to the clinic but monopolisation of the consultation by the companion was rare. When a companion was present, there was more mutual eye gaze between the consultant and the patient. Interruptions were present in 23.6% of consultations and were associated with a significant increase of the length of the consultation. Table positioning did not seem to affect the dynamics of the outpatient consultation.
Conclusion: Companions are highly valuable for promoting patient engagement and their presence should be encouraged in surgical outpatients. Interruptions should be kept to a minimum to avoid unnecessary delays. Further studies should be conducted to investigate the effect of companions, interruptions and table positioning during a consultation on patient outcomes.

Introduction

Surgical outpatient consultations are a complex task that require a broad range of non-technical skills to conduct in an effective manner. Consultations usually involve the combination of history taking, examination, reviewing and interpretation of results, explaining diagnoses, exploring treatment options while building and maintaining rapport, and addressing patients concerns, questions and fears. These are all done while facing time pressures. Patients also find the outpatient clinic environment challenging and highly stressful.[1]

Evidence regarding high-quality outpatient clinics is scattered and revolves around factors that have been identified to influence patient satisfaction, which in turn influence patient outcomes due to increased compliance and continuity of care.[2,3] Some factors are modifiable such as those related to the physical environment, for example, waiting room atmosphere, cleanliness and privacy.[4–7] Some are related to factors that may be more easily controlled from a surgeons' perspective such as waiting times, consultation length and patient–doctor communication (verbal or non-verbal).[4–9] There are also non-modifiable factors that affect patient satisfactions which fall under the umbrella of patient demographics such as age, gender, education and race.[4–6,9]

Excellent doctor–patient communication is essential for quality outcomes for both the parties.[10–12] Several studies in the primary care setting show that consult length,[13,14] presence of companion,[13,15] gender[16] and room layout[1] can all influence patient engagement.

Surgical outpatient consultations may involve difficult discussions about the diagnosis and options for a patient. For patients, companions could be a source of physical and emotional support.[13,17] As described previously, surgical outpatient consultations pose unique challenges to achieve excellent practitioner and patient outcomes. Previous systematic reviews and meta-analysis investigating the role and effect of a companion in outpatient consultations were largely based on available literature in the non-surgical setting.[15,18,19] The rates of patient accompaniment ranges between 15% and 86% dependent on the context of consultation, while mean rates of accompaniment in adult patients is 37.6%.[15,18,19] There is limited evidence on the effect of a companion on a surgical consultation. Isenberg et al. in 2018 observed that a companion in a pre-surgical visits resulted in better patient–doctor communication but did not affect patient or surgeon satisfaction.[20]

Objectives

We aimed to determine what the modern-day surgical outpatient consultation consisted of and break down its components to determine factors that may affect the dynamics of it.

Methods

This was a single-centre observational cohort study conducted in The Queen Elizabeth Hospital, South Australia. This study was approved by the Central Adelaide Local Health Network (CALHN) Ethics Committee, reference number HREC/17/TQEH/284.

Whole surgical outpatient clinics were audio visually recorded between October 2018 and February 2019 as part of a larger consultant surgeon coaching study to improve surgeons' non-technical skills. Surgeons and patients were consented for audio–visual recording.

Inclusion criteria for surgeons was either a Surgical Consultant or a Surgical Fellow consulting in surgical outpatient clinics employed by CALHN at the time of study who have consented prior to start of study. All patients scheduled to attend a surgeon's outpatient consultation during the recording session were considered; however, only those who consented to participate proceeded to recording. Exclusion criterion was declination to participate.

All videos were reviewed by investigators and data was entered into a pre-populated data collection sheet. The data that were collected from observation of the videos consisted of:

- Type and timing of consultation; information discussed, presence of companion; sex of doctor, patient and companion; relationship of companion to the patient; table configurations; presence and type of interruptions.
- Whether the consultation was felt to be monopolised by the companion and methods that the consultants used to move focus away from the companion.
- Commonly asked questions and misconceptions.
- Date of consultation.
- Total consultation time.
- Patient, consultant and companion talk time.
- Mutual eye gaze between the consultant and patient or companion.
- Number of questions asked by the consultant, patient and companion.

In teams, data were collected at least twice. The following data fields were predetermined to be the most prone to human error in capturing: talk time, eye gaze and number of questions asked. Owing to the dynamic nature of consultations, the authors agreed to accept a 20% allowance in data deviation, such that if the difference between viewing 1 and viewing 2 was greater than 20%, the data point must be recaptured until the difference between the two data points was less than 20%, with the first 'accurate' data point added to the final analyses. This process was managed by an investigator (JLR) who did not collect raw data.

Handheld stopwatches were used to capture talk time and eye gaze. Nominal data, such as sex of patient, were checked once, and any data collection errors corrected. The final values were tabulated into a master Excel sheet. Data regarding time were noted to the nearest second. Timing of the length of the consultation began when the patient entered the room and stopped when they exited. Physical examinations occurred off camera and no data were collected during this period. An interruption was defined as unplanned external disruptions to the natural consultation out of control of the consultant, patient or companion such as a telephone call.

Statistical analysis was carried out initially using univariate linear mixed-effects models to compare factors that may affect different markers of patient engagement. Clustering on consultant was adjusted for each model by including consultant ID as a random effect. The interaction between the presence of companion and type of consultation was then included in linear mixed-effects models for several outcomes. Post hoc comparisons were carried out, resulting in mean differences, 95% confidence intervals and *p*-values. Assumptions of a linear model was found to be upheld in all models by inspection of histograms and scatter plots of residuals and predicted values. The statistical software used was SAS 9.4 (SAS Institute Inc., Cary, NC, USA). Statistical significance is achieved with a p-value of ≤ 0.05.

Results

A total of 182 surgical outpatient consultations by 12 surgeons (Fellows of the Royal Australasian College of Surgeons or intentional equivalents) were recorded. The consultants consisted of two general surgeons, four breast and endocrine surgeons, one upper gastrointestinal and hepatopancreatobiliary surgeon, one hepatopancreatobiliary surgeon, two colorectal surgeons and two urological surgeons. One consultant was female. Each surgeon contributed between nine and 24 patient consultations (median = 16). Table positioning and seating arrangements were recorded (Fig. 1). Four different arrangements were noted with the most common being position 2 at 46.7% (85/182), followed by 1 (31.9%), 4 (12.6%) and 3 (8.8%). Surgeons were observed to introduce themselves in 82.6% of first consultations.

Female patients made up 57.7% of our cohort. The total consult time, proportion of patient and consultant talk time were not

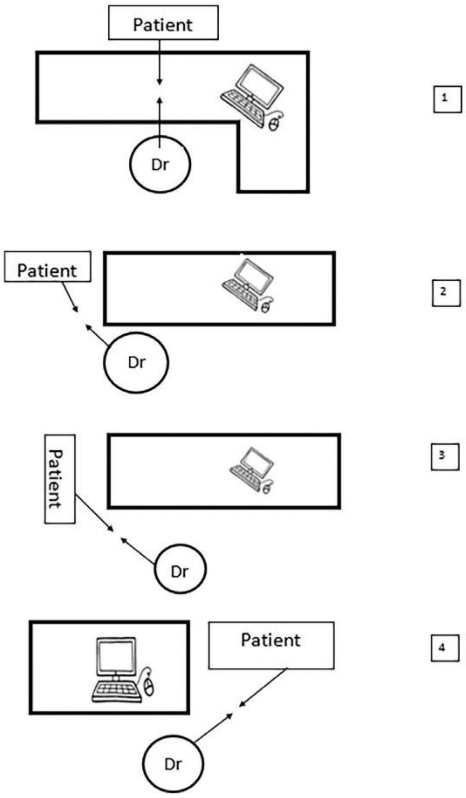

Fig 1. Table positioning in relation to doctor, patient and computer screen. Eye gaze is represented by arrows.

Table 1 The average surgical outpatient consultation

	Frequency (%)	Mean (standard deviation)
Type of consultation		
Benign	107 (59%)	—
Malignant	75 (41%)	—
Nature of consultation		—
Pre-surgery	55 (30%)	—
Post-surgery	20 (11%)	—
Follow-up	87 (48%)	—
Pre-surgery and follow-up/ post-surgery	20 (11%)	—
Mean total consultation time		
Overall		12:17 (08:12)
Pre-surgery		17:39 (8:16)
Post-surgery		8:21 (4:48)
Follow-up		9:05 (6:26)
Pre-surgery and follow-up/ post-surgery		15:22 (9:08)
Mean talk time in minutes (proportion as percentage)		
Total of whole consultation	(73.4%)	09:02 (05:44)
Patient	(19.5%)	02:23 (01:59)
Consultant	(51.9%)	06:23 (04:16)
Companion (when present)	(8.1%)	01:01 (01:13)
Mean mutual eye gaze time in minutes (proportion as percentage)		
Consultant–patient	(51.2%)	06:18 (05:03)
Consultant–companion	(11.3%)	01:24 (01:41)
Average number of questions asked		
Patient	—	3.4 (3.0)
Companion	—	2.3 (2.9)
Consultant	—	15.1 (11.8)

Percentages expressed in parentheses represent the time of interest in relation to total consultation time.

affected by whether the consultant and the patient were of the same sex.

Most of the consultations were follow-ups (47.8%), followed by pre-surgical (30.2%) and post-surgery (11%). The remaining 11% of consults consisted of both elements of pre- and post-surgery. This affected the total consultation time where pre-surgical consults went on longer than follow-up and post-surgical consultations ($p < 0.01$). The most frequently discussed information at consultations involved the options of management and information on pathology (81.3% and 55.5%, respectively). The less discussed information was regarding symptomology, surgical planning and post-surgical expectations at 33.5%, 31.9% and 20.9%, respectively.

The mean time for all consultations was 12 min 17 s (±8 min 12 s). The mean time taken for follow-up consultations was 9 min 5 s (±6 min 26 s), 17 min 39 s (±8 min 16 s) for pre-surgical consultations, 8 min 21 s (±4 min 48 s) for post-surgical consultations and 15 min 22 s (±9 min 8 s) when elements of both pre- and post-surgery were present.

73.4% of the whole consultation was spent in conversation. On average, the consultant talked for 6 min 23 s (±4 min 17 s) or 52%, and the patient for 2 min 23 s (±1 min 59 s) or 19.5%. When a companion was present, they spoke for an average of 1 min 1 s (±1 min 13 s) or 8.1%. The remainder of time consisted of review of notes and results, performing paperwork including note keeping and responding to interruptions.

The average consultation time was longer when a companion was present ($p < 0.01$) or when interruptions occur ($p < 0.01$). The mean consultation length was longer in benign consultations, but not statistically significant ($p = 0.11$). The consultant spent 6 min 19 s (±5 min 3 s) or 51.2% maintaining eye contact with the patient, and 1 min 18 s (±1 min 41 s) or 11.3% with the companion, when present. When a companion was present, mutual eye gaze between the consultant and patient was significantly higher ($p < 0.01$). This was true for malignant and benign conditions.

Forty-eight (26.4%) patients brought at least one companion to the consultation, and only two patients brought more than one companion. Patients were most likely to bring their partners (60%), followed by children (20%), then carers, friends and siblings.

Table 2 Summary of findings on how mean consultation time, mutual eye gaze and proportion talk time are affected by the presence of companion, type of consultation, sex of patient and presence of interruptions

(a)

	Mutual eye gaze (s)					
	To patient		Mean difference (95% CI) *p*-Value	To companion		Mean difference (95% CI) *p*-Value
Companion absent vs. companion present	342	522	−181 (−279, −82) $p < 0.001$	—	80	—
Benign consultation vs. malignant consultation	468	396	72 (−19, 163) $p = 0.120$	81	79	2 (−66, 70) $p = 0.959$
Female patient vs. male patient	411	453	−41 (−154, 72) $p = 0.474$	42	118	−75 (−140, −10) $p = 0.025$
No interruptions vs. interruptions present	390	474	−84 (−182, 12) $p = 0.089$	46	114	−69 (−142, 4) $p = 0.063$

(b)

	Mean consultation time (s)		Patient talk time		
	Value	Mean difference (95% CI) *p*-Value	Proportion over total talking time		Mean difference (95% CI) *p*-Value
Companion absent vs. companion present	421 vs. 608	−210 (−363, −56) $p = 0.008$	0.3	0.2	0.11 (0.06, 0.16) $p < 0.001$
Benign consultation vs. malignant consultation	571 vs. 460	117 (−25, 258) $p = 0.105$	0.2	0.3	−0.05 (−0.10, −0.01) $p = 0.019$
Female patient vs. male patient	479 vs. 544	−79 (−255, 96) $p = 0.373$	0.2	0.3	−0.02 (−0.07, 0.04) $p = 0.489$
No interruptions vs. interruptions present	375 vs. 654	−298 (−450, −146) $p < 0.001$	0.2	0.3	−0.00 (−0.05, 0.04) $p = 0.866$

CI, confidence interval.

Table 3 Summary of results on how average consultation time, mutual eye gaze to patient, number of questions asked and proportion of talk time are affected by the presence of companion and type of consult (benign/malignant)

		Presence of companion			
	Type of consult	No	Yes	Mean difference (95% CI)	*p*-Value
Mutual eye gaze to patient (s)	Benign	375.86	624.73	−248.87 (−397.31, −100.43)	0.001
	Malignant	316.1	453.46	−137.37 (−262.44, −12.30)	0.032
Average consult time (s)	Benign	751.87	996.77	−244.89 (−480.65, −9.14)	0.042
	Malignant	648.5	833.85	−185.35 (−384.05, 13.36)	0.067

CI, confidence interval.

Monopolisation of the consultation by companion occurred in six out of the 48 consultations, but for most (4/6) this was not detrimental as this occurred as the patient was unable to answer the questions asked. In 87.5% (42/48) of consultations, the surgeon was observed to actively move focus away from the companion when they were speaking too much. The most common method was by switching eye gaze towards the patient (42/42) followed by repositioning of body towards the patient (17/42). In two consultations, the surgeon directly addressed the patient to switch focus away from the companion.

The surgeon asked 15.1 (±11.8) questions on average, while the patient and companion asked 3.39 (±2.98) and 2.31 (±2.87) questions, respectively. The number of questions asked by patient was demonstrated to be significantly affected by the nature of consultation, such that patients asked more questions during pre-surgical consultations ($p < 0.01$) compared to follow-up or post-surgical consultations.

Interruptions occurred in 23.6% (43/182) of consultations. These were surgeons leaving the room at 52.2%, interrupted by another person entering the room at 26.1% and interrupted by a telephone call at 21.7%. There was a statistically significant increase in the number of questions asked by both the consultant and companion when there were interruptions during the consultation.

Interestingly, table positioning did not significantly affect mutual eye gaze between the consultant and patient or companion, nor did it affect the proportion of patient talk time. Tables 1–3 display the summary of the results.

Discussion

Most of the consultation was spent talking. Consultants spoke the most, followed by the patient and companion. The presence of a companion significantly increases the engagement of the patient such that there is more eye contact between the consultant and the patient, and their presence should be encouraged. This study provides evidence to aid in the design of future surgical coaching programmes. Authors shall investigate question-asking patterns of consultants, patients and companions in the future. Further studies should also be conducted to investigate the effect of companions, interruptions and table positioning during a hospital visit and patient outcomes.

Companions were generally active participants and asked questions during the consultations, which would lengthen it. Companions are a source of physical or emotional support for patients, especially when dealing with difficult updates regarding their health.[13,17] Current literature also suggests that they may have an active part to be involved in the diagnosis, understanding of information and decision-making by the patient.[13,15,20–25]

Some authors have found that the presence of companions during a consultation may have negative implications to the patient.[20,22,26,27] [20,22,26,27] A meta-analysis in 2011 investigated the impact of familial presence in routine medical visits and has found that the majority of studies were inconclusive regarding the favourableness of familial presence during consultations, but none were negative.[18] Further systematic reviews have found that the presence of a companion is generally useful, albeit situational.[15,19] Illness affects more than just the patient alone; it also affects their friends and family. Family members, for instance, would have an influence on the decisions made by the patient.[28,29] Therefore, it would be beneficial for them to be present allowing them to participate actively in the consultation, which would result in a greater understanding of the disease process, management options, expectations and be a part of the patients' treatment journey.

Non-verbal communication such as eye contact plays an important role in mediating engagement and attention in dyadic conversations,[30] and is particularly important for patient-centred communication.[31,32] Mutual eye gaze not only acts as an indicator of interest and attention by each member, but also promotes the 'openness' of conversation and is unconsciously used to signal flow and emotionality in the interaction,[33] as well as establish a state of mutual engagement.[34] Mutual eye gaze between a consultant and the patient, as well as their companion was used as a marker for engagement.

Patients and consultants appeared to be more engaged with each other in consultations when a companion is present. Eye gaze time between the consultant and patient increased significantly when a companion is present. This is possibly due to either a conscious or unconscious behaviour by the consultant to make the patient the focus of consultation, evidenced by our observation that consultants were shifting focus away from the companion most commonly by shifting gaze towards the patient. The increase in eye gaze time may inadvertently be perceived positively by the patient as increased engagement and patient centredness. A companion brings benefit to the surgical consultation without taking focus away from the patient, thus their presence should be encouraged in the first instance unless found detrimental by the consultant in a case-by-case basis.

Interruptions may lead to reduced efficiency which increases cost as well as increased workload and errors.[35,36] Our results have shown that with the introduction of interruptions to the consultation, alterations to the dynamics of the consultations were observed. However, interruptions did not result in repeated questions, information giving or overt reactive body language from the patient.

It is important that the table orientation does not prevent the doctor and patient from being about to make eye contact. Having a shared desk with the doctor or second screen facing the patient can allow for better understanding and decision-making.[20,21] Furniture orientation did not affect the dynamics of the outpatient consultation from our observation. Most interestingly, the mutual eye gaze duration between the consultant and patient remained similar throughout the different table arrangements. This would demonstrate that the surgeons have adapted to maintain focus on the patient rather than the computer screen during consultations. Given the current evidence in the literature, the premise of having a screen that is mutually viewable to be able to use as an adjunct to the consultation was deemed useful. Barring arrangement 1 as seen in Figure 1, the monitors could be easily rotated to facilitate mutual screen viewing. When designing table layouts, the seating position of the patient, companion and doctor in relation to the computer screen should be carefully thought about to allow optimal information sharing, safety and comfort.

This study design has resulted in certain limitations namely, the Hawthorne effect, which may be present as both surgeons and patients were all aware of the recordings being carried out. They were, however, not aware of the outcomes that we looked for and, thus, less likely to make a significant impact on the results reported. Due to the retrospective nature of this study, we could not attain data that may be valuable such as patient's preference for information, satisfaction of consultation and outcome. Although we would be limited by the relatively small number of surgeons, this is a large cohort of patients compared to what has been reported in the current literature. While interesting to note the factors that influence the dynamics of the outpatient consultation, the implications from the results of this study with regard to patient outcomes should be studied. Future research would also need to be directed on methods that consultants can apply to improve on these markers. It would also be prudent to design future studies to gather patient feedback, to test the relationship between that and the observational findings made in the current study.

Conflict of interest

None declared.

Author contributions

Ying Yang Ting: Conceptualization; data curation; formal analysis; investigation; methodology; visualization; writing - original draft. **Jessica Reid:** Conceptualization; data curation; formal analysis; investigation; methodology; visualization; writing-review & editing. **Ellie Treloar:** Data curation; methodology; visualization; writing-review & editing. **Wei Shan Lee:** Data curation; investigation. **Jeeng Yeeng Tee:** Data curation; investigation. **Wen Jing Cong:** Data curation; investigation. **Dangyi Peng:** Data curation; investigation. **Suzanne Edwards:** Investigation; resources;

software. **Jesse Ey:** Data curation; investigation. **Nicholas Edwardes:** Data curation; resources. **Nelson Granchi:** Data curation; resources. **Guy Maddern:** Project administration; supervision; writing-review & editing.

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Chapter 6: Conclusion

Surgical coaching is a new concept, despite the practice being well established in other high-performance fields such as aviation, entertainment, business, and sport. This thesis aims to research and report on several areas with the goal of "getting the conversation started" and establishing a formal Continuing Professional Development framework for the coaching of non-technical skills.

The first manuscript included is a Systematic Review summarising and quantifying research performed to date for coaching of non-technical skills in surgeons. A total of 19 manuscripts were suitable for inclusion. There was strong evidence that surgeons could improve when coached in a group setting but limited evidence for individual coaching.

The second manuscript is a pilot intervention study. Consultant surgeons were recorded conducting standard outpatient clinic appointments. Surgeons then watched these recordings with a surgeon-coach and identified areas of strength and areas for improvement. This process occurred three times in total. Blinded, independent reviewers (two surgeons, two psychologists) assessed the recordings using the Maastricht History-Taking and Advice Scoring Global Rating List (MAAS), a common tool for evaluating non-technical skills. Coaching significantly improved MAAS scores and all surgeons involved found the method of learning was suitable. Importantly, nearly all of them thought that coaching had improved their individual performance.

The third manuscript reports on a survey completed by consultant surgeons and describes their attitudes to peer-coaching. Generally, surgeons were supportive of coaching as a concept and of including coaching as part of Continuing Medical Education. Younger surgeons were more receptive, and surgeons who had experienced coaching previously were more likely to be supportive. Most agreed that they would like to choose their coach; some surgeons were happy to have a coach from another field such as psychology, others were happy to have another surgeon.

The fourth manuscript identifies and reports on a new skill that surgeons are currently adapting to, the presence of the computer in the consultation room. For most surgeons, computers and electronic medical records have been introduced with little to no training, and no research on the impact to the patient. The researchers surveyed patients in the clinic to ask them how the computer effected their recent interaction. Patients reported that computers and the electronic medical record were useful and necessary for healthcare and were overall positive about the introduction of computers to the clinic. Patients reported that their doctor was not distracted by the computer, and helpfully used the computer to show relevant blood test or imaging results. While more research is required here, patients seem to have a positive attitude toward doctors using computers during the consultation.

The fifth manuscript is an observational study using data gathered from the pilot study (chapter 2). While the Candidate is not a primary author on this manuscript, inclusion is warranted for the following reasons; all primary data (recordings) were collected as part of this Master degree and the ANZ manuscript would not exist without the initial data collection.

While surgical coaching research is continuing to emerge, there is a lot to be optimistic about. The work published in this thesis shows that surgeons are receptive to coaching and that coaching can improve performance. The next step is to link this to sustained NTS in surgeons, and improved patient outcomes.

Appendix – Statement of Authorship

Statement of Authorship

Title of Paper	Coaching to enhance qualified surgeons' non-technical skills: A systematic review
Publication Status	Published
Publication Details	British Journal of Surgery. 2021 Oct;108(10):1154-61.

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Name of Principal Author (Candidate)	**Dr Nelson Granchi**		
Contribution to the Paper	Formulation of research question, methodology, data collection, data analysis, original draft preparation		
Overall percentage (%)	60%		
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Signature		Date	10/01/2022

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By signing the Statement of Authorship, each author certifies that:

i. the candidate's stated contribution to the publication is accurate (as detailed above);
ii. permission is granted for the candidate in include the publication in the thesis; and
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Title of Paper	Improving surgical excellence: A video-based pilot intervention in the outpatient clinic
Publication Status	Submitted 19 November 2021
Publication Details	British Journal of Surgery Open

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Title of Paper	Peer coaching as a form of performance improvement: What surgeons really think.
Publication Status	Published
Publication Details	Journal of Surgical Education. 2021 Mar 1;78(2):525-32.

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Title of Paper	The impact of computers on the surgical consultation
Publication Status	Published
Publication Details	ANZ Journal of Surgery. 2021 Oct;91(10):1965-1967

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Title of Paper	The doctor will see you now: Eye gaze, conversation and patient engagement in the surgical outpatient clinic. An Australian observational cross-sectional study
Publication Status	Published
Publication Details	ANZ Journal of Surgery. 2021 Nov;91(11): 2376-2381

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