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Reciprocal peer coaching for practice improvement in surgery: a pilot study

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Abstract

Background Peer coaching has been associated with much higher rates of practice changes and new skill implementation compared to common used modalities but bilateral peer coaching structures where seniority is not a requirement to coach have not been studied. The purpose of this study was to implement and evaluate a reciprocal peer coaching pilot program for practicing surgeons to inform future coaching program design.

Methods A multicenter reciprocal peer surgical coaching program was designed according to the framework developed from previous studies by our group. The coach–coachee matching process was voluntary and autonomous. All participants received basic coaching skills training. Pairs were instructed to complete two coaching sessions, alternating between the coach or coachee role for each session. Data were collected through questionnaires and structured interviews.

Results Twenty-two participants enrolled in the pilot study and completed the coach training (88% enrollment rate). During the first wave of COVID-19, 12 participants withdrew. Of the five pairs that completed the program, three pairs were composed of general surgeons, one of orthopedic surgeons, and one ophthalmologic surgeon. Three sessions were conducted live in the OR, five virtually, and one involved an in-person discussion. Overall satisfaction with the program was high and all participants expectations were met. Participants were significantly more likely to predict "routinely" asking for feedback from their partner after study completion (6, 66%) compared to pre-intervention ($p = 0.02$).

Conclusion This pilot study supports the feasibility of a peer coaching model for surgeons in practice that emphasized reciprocity and participant autonomy. These key elements should be considered when designing future coaching programs.

Keywords Surgical coaching · Reciprocal coaching · Peer coaching · Continuous professional development

Background

Achieving mastery in surgery depends on maintaining and advancing surgical skills once formal training is over. During residency, trainees are exposed to continuous guidance and feedback from experienced surgeons responsible for their training and evaluation. Once training ends, however, this process practically ceases and surgeons are left to develop their skills largely in isolation for the duration of their careers [1–3]. In addition, most traditional continuous professional development (CPD) activities, such as journal reading and lecture attendance, are not interactive and lack personalized feedback, thereby rarely translating into real changes in practice [4].

Recently, educators have shown increasing interest in using peer coaching as a means to provide the personalized feedback needed to move the needle on practice

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improvement in surgery [5–7]. Formalized coaching has been shown to improve technical skills and outcomes over and above traditional training among trainees [8, 9], and participation seems to translate into real practice changes [10] among practicing surgeons. Implementation has been proven feasible [5, 6], and studies with certain aspects similar to peer surgical coaching have proven to be useful in disseminating and implementing surgical programs, such as the enhanced recovery after surgery [11].

While peer surgical coaching has been positively perceived [10, 12] and a recent worldwide survey found that receptivity to surgical coaching is high [13], it remains unclear how to design and implement a widely acceptable program across the surgical spectrum. One of the key characteristics is the coaching relationship. Studies in executive coaching have made it clear that coach–coachee matching is critical for long-term success [14]. Despite one study demonstrating that participants acquire a reciprocal coaching relationship naturally [15], most pilot studies have selected senior surgeons as coaches, and roles have been established before beginning the program [7, 16–19]; however, this limits widespread uptake of such programs due to small numbers of "coaches" and potentially limits participation by propagating stigmas that only junior surgeons benefit from coaching. To date, reciprocal peer coaching structures, where seniority is not a requirement to coach, have not been studied.

Therefore, the purpose of this study was to implement and evaluate a reciprocal peer coaching pilot program for practicing surgeons to inform future coaching program design.

Methods

Program design

A multicenter reciprocal peer surgical coaching program was designed according to the framework developed in a previous study by our group [12]. The coach–coachee matching process was voluntary and autonomous. Both virtual and in-person modalities could be used for the coaching interactions. After undergoing formalized training in coaching, pairs were instructed to complete two coaching sessions, taking the coach or the coachees' role for each session. Each pair was given the autonomy to set the goals, format, and timeline of the sessions. However, surgeons were asked to follow coaching models and the coaching mindset was discussed during training for both sessions.

Participant recruitment

Surgeons licensed for independent practice by their regional licensing authority in specialties recognized by the American Board of Surgeons were eligible for study enrollment. Participants were selected for recruitment based on expressed interest in participation. When participants accepted the invitation, they were asked to nominate two or three surgeons, in order of preference, with whom they would want to be partnered. Selection of partners was not influenced by researchers. The nominated surgeons were approached one by one to explain the purpose of the study. Once agreement was reached on partnership, study consent was signed. The first cohort of participants was recruited in January 2020, but due to work disruptions resulting from COVID-19, a number of original pairs dropped out and a second cohort of participants was recruited in October 2020.

Training

After enrollment, participants underwent a 2-h training session regarding coaching best practices by either a Professional Certified Coach (DK) or a member of the research team (SV), certified by the Academy of Surgical Coaching [20]. Training sessions emphasized using the GROW model for coaching sessions the acronym stands for goals, reality, options (for barriers), and will (for the way forward) [21]. The use of the SMART model was also emphasized for goal setting. The SMART acronym calls for goals that are specific, measurable, achievable, realistic, and time-based [22]. Training sessions also highlighted the "coaching mindset" which asks the coach to remember that the coachee and their goals always drive the agenda [20]. Training included learning how to listen and what types of questions to ask, understanding how to give feedback, and how to establish feedforward [23]. A handout summarizing training content was provided to participants for later reference, and they were instructed to contact the coaching trainers in case of questions.

Coaching sessions

Participants were asked to provide researchers with the date of the sessions and the role they would play. Surgeons were informed they could scrub in to or observe the surgery, use a pre-recorded video, or coach non-technical skills, depending on their needs and goals. Goal setting could occur on a separate interaction previous to the first session. On the day of the session, participants received a REDCap survey link with a coach/coachee log to be completed after each session.

Definitions

To ensure a homogenous understanding of terms, participants were given the following definitions:

Coaching was defined as "a process whereby an experienced and trusted role model, advisor, or friend guides

another individual in the development or self-reflection of ideas, learning, and professional development, working with mutual goals, and providing support for changes in practice [10]."

Peer was defined as "a person who is an equal [24]."

Feedforward was defined as "a process that provides images of future behaviors, options, and solutions with the purpose of creating performance improvement" [23].

Data collection

After training, every participant was asked to fill out a demographic form and pre-intervention questionnaire (Appendix 1). On the day of the coaching session, each participant received an e-mail with a link to the specific log. After the two coaching sessions were complete, surgeons received a post-intervention questionnaire link (Appendix 2). Both the pre-intervention and post-intervention questionnaires used a 5-point Likert scale to evaluate the needs, motivations, barriers, structure, and training, as well as open questions exploring expectations and emotions. All questionnaires were collected through REDCap. REDCap is a secure web application specifically geared to support online and offline data capture for research studies. REDCap and SurveyMonkey are GDPR (general data protection regulation) and HIPAA (Health Insurance Portability and Accountability Act) compliant. At program completion, one author (SV) conducted one-on-one semi-structured interviews with each participant to evaluate the experience and receive feedback and recommendations regarding future program design. Interviews lasted 20 min and were conducted virtually via Zoom. Questionnaires and semi-structured interviews were available in both English and Spanish. Surgeons who withdrew from the program were asked to fill out an anonymous 5-question survey via SurveyMonkey to understand the reasons for withdrawal and any future expectations for participation.

Data analysis

Data from REDCap logs and SurveyMonkey were downloaded for local statistical analysis. Interviews were recorded and transcribed verbatim. Logs and interview transcripts were deidentified before analysis. Quantitative data from survey responses were analyzed using descriptive statistics, including means with standard deviations and maximum and minimum values. Student's *t*-test was used to compare responses before and after study participation. Qualitative data were analyzed according to grounded theory methodology by two independent researchers (SV, JM), with the senior author (CM) serving as a tiebreaker in the case of disagreement. Interview and log data were coded into themes developed based on prior research by our group [12], and themes were expanded as new trends emerged.

Ethics and funding

The research protocol was approved by the Institutional Review Board at McGill University. This research was supported by a Royal College of Physicians and Surgeons of Canada Medical Education Research grant (2017-RC-MERG).

Results

Participant demographics

Of 25 surgeons who were invited to participate, 22 participants enrolled in the pilot study and completed the coach training (88% enrollment rate). During the first wave of the COVID-19 pandemic, 12 participants (55%) withdrew from the study. The most common reason for withdrawal was lack of appropriate cases and/or diminished OR access (10; 83%), while two participants received promotions to demanding administrative positions and felt they no longer had time to continue with the study.

Participant characteristics are presented in Tables 1 and 2. Ten surgeons (5 pairs), of whom 7 (70%) were male, finished all coaching sessions. Eight surgeons served in both

Table 1 Participant demographics

	N	%
Total participants	10	100
Male	7	70
Female	3	30
Specialty		
General surgery	6	60
Orthopedics	2	20
Ophthalmology	2	20
Fellowship		
Yes	9	90
No	1	10
Years in practice		
0–5	3	30
6–15	3	30
15–25	3	30
> 25	1	10
Place of practice		
Canada	4	40
Mexico	6	60
Type of practice		
University affiliated	7	70
Private practice	3	30

Table 2 Pair characteristics

Pair	Primary participant	Peer selected	
1	Male, 16–25 years in practice	Male, 0–5 years in practice	Appointed to different hospitals
2	Male, 6–15 years in practice	Male, 0–5 years in practice	Appointed to the same hospital and service
3	Female, 16–25 years in practice	Female, 16–25 years in practice	Colleagues in the same clinic
4	Male, 6–15 years in practice	Male, 0–5 years in practice	Appointed to different hospitals
5	Female, 6–15 years in practice	Male, > 26 years in practice	Appointed to the same hospital

the coach and coachee roles, while two surgeons only performed one role as mutually agreed by the pair. Three pairs were composed of general surgeons, one pair of orthopedic surgeons, and one pair of ophthalmologic surgeons. None of the surgeons had participated in a surgical coaching program previously.

Questionnaire data

Pre-intervention opinions regarding peer coaching in surgery A total of 15 participants, including withdrawals, completed the pre-intervention questionnaire (Appendix 1). The idea of a coaching program, in general, was highly rated, with all participants rating the need for such a program as "above average" or "great" (13, 86%). Most participants found the idea of implementing a surgical coaching program to be "very appealing" or "extremely appealing" (12, 80%). However, the majority predicted the implementation of a surgical coaching program to be "difficult" or "challenging" (13, 86%), while only two felt it would be "fairly easy" (2, 22%); with the universal applicability rated as "neutral" (9, 60%) and "likely" (4, 26%).

The perceived change in relationships was viewed as positive, with potential improvement after the program. There was a consensus that the surgeon participating in such a program would be perceived positively by the surgical team. Only a small percentage of participants said they "routinely" ask for feedback (3, 20%), with the majority stating that it occurred "often" (8, 53%) or "sometimes" (2, 13%).

All participants who were still active clinically expected coaching to have a positive impact on their practice, and all respondents felt the goal-setting exercise done during training was very helpful.

Regarding feelings about being observed and receiving feedback, participants expressed feeling: optimistic (10, 66%), excited (5, 33%), happy (3, 20%), and hopeful (5, 33%); nervousness (3, 20%), anxiousness (3, 20%), and fear (2, 22%) were reported less frequently.

Motivations to participate in the program were to enhance current skills (13, 87%), to improve patient care (9, 60%), to acquire a new skill (8, 53%), to find a new CPD modality (6, 40%), because it was relevant to their practice (3, 20%), and for enjoyment (3, 20%).

Regarding anticipated barrier to participation, logistical barriers were the most prevalent, including scheduling conflicts (12, 80%), lack of time (9, 60%), lack of cases (6, 40%), geographical barriers (6, 40%), and remuneration concerns (1, 1%). One participant expressed surgical culture as a barrier citing "*hierarchical obstacles, the coach may want to impose their knowledge, particularly if they are older.*"

Session logs

According to the coach/coachee logs (Appendix 3), three sessions were conducted live in the OR, five were done virtually, and one in person at the hospital. Six sessions were focused on technical skills and four on non-technical skills (Table 3).

When participants undertook the role of a coach, they felt calm (4/9), happy (2/9), comfortable (2/9), and anxious (1/9). The most meaningful things participants commented they gained from the interaction were communication skills (5/9), understanding reciprocal learning (5/9), and the importance of self-assessment (1/9). On self-reflection, participants felt they could improve their coaching by being more patient and not rushing the coachee (5/9), giving better

Table 3 Session summary

Pair	Location Session 1	Focus Session 1	Location Session 2	Focus Session 2
1	OR	Technical skills (procedural)	Virtual	Non-technical skills (administrative)
2	In-person	Non-technical skills (use of software)	OR	Technical skills (procedural)
3	Virtual	Technical skills (physical exploration)	Virtual	Non-technical skills (administrative)
4	Virtual, video review	Technical skills (procedural)	Virtual, video review	Technical skills (procedural)
5	OR	Technical skills (procedural)	NA	NA

feedback (3/9), and better organizing their thought processes (2/9).

As coachees, participants most frequently reported choosing their partner as a coachee because of their expertise (6/9) and because they trust them (3/9). Every participant commented on their particular actions or gains after the session, including technical and non-technical aspects, as well as personal improvement. They found that the best thing their coach did was provide good feedback (3/9), listen (2/9), stay calm (1/9), share their experiences (1/9), be respectful (1/9), be patient (1/9), and "*reassure me*" (1/9).

Post-intervention opinions regarding peer coaching in surgery

Nine (90%) participants completed the post-intervention questionnaire (Appendix 2). Overall satisfaction with the program was high (moderately satisfied 1, 11%; very satisfied 2, 22%; extremely satisfied 6, 66%). All participants' expectations were met, all found the experience valuable and all enjoyed the experience and noted they would participate in future programs.

After the intervention, all but one participant felt their was a "great need" (6, 66%) or "above average need" (2,22%) for wide-spread adoption of peer coaching for practice improvement in surgery, compared to pre-intervention ($p=0.22$). The perceived feasibility of peer coaching being routinely adopted into practice improved slightly compared to the pre-intervention opinion, but participants still feel it would be "challenging" (5, 55%; $p=0.01$). Participants were significantly more likely to predict "routinely" asking for feedback from their partner after study completion (6, 66%, $p=0.02$). As for clinical practice, participants agreed that the intervention had "somewhat of an impact" (3/9, 33%), a "moderate impact" (3/9, 33%), a "significant impact" (2/9, 22%), and a "light impact" (1/9, 11%) ($p=0.17$ in comparison to expectations pre-intervention).

When asked about their feelings while being observed and having feedback, most feelings were positive, such as optimistic (6, 66%), excited (5, 55%), happy (3, 33%), hopeful (5, 55%), with nervousness (3, 33%), and anxiousness (1, 11%) being reported less frequently. Having a first session to establish goals and rapport made most participants feel more comfortable (6, 66%). Three participants (33%) expressed being less comfortable as a coachee than as a coach.

Statistical analysis showed no significant difference in opinions from the pre-intervention to the post-intervention questionnaires, except for the adoption and feedback questions (Table 4).

Semi-structured Interviews

Responses were organized around *Understanding Coaching, Preferred Design and Program Format, Perceived Benefits to Coaching, and Barriers to Coaching Participation* according to a previously published framework [12].

Understanding coaching

All participants agreed that after participation in this program, they had a better understanding of what coaching is, citing aspects like guidance, self-assessment, and self-reflection, and the unexpected side benefits of coaching. Understanding that your partner is your peer and not your student and how to have a non-threatening conversation also came up. One participant expressed the meaning of coaching should be rectified to not misunderstand it. Sample statements reflecting these thoughts included the following:

Table 4 Comparison of mean pre-intervention and post-intervention opinions (Likert scale 1–5)

CodeS	Pre-intervention			Post-intervention			*p*-value
	Mean	SD	Min, Max	Mean	SD	Min, Max	
Need (Q1, Q1)	4.3	0.5	4, 5	4.6	0.7	3, 5	0.22
Adoption (Q5, Q3)	3	0.7	2, 4	3.4	0.5	3, 4	0.01*
Applicability (Q6, Q9)	3.4	0.5	3, 4	3.6	0.7	3, 5	0.29
Relationship (Q7, Q4)	4.6	0.5	4, 5	4.4	0.9	3, 5	0.39
Impact on practice (Q12, Q10)	4	1	2, 5	3.7	1	2, 5	0.17
Feedback (Q13, Q11)	4.1	0.8	3, 5	4.7	0.5	4, 5	0.02*
Compare to a lecture (Q2, Q2)	4.3	0.7	3, 5	4	1	3, 5	0.09
Compare to a video (Q2, Q2)	4.1	0.6	3, 5	4.2	0.83	3, 5	0.29
Compare to a hands-on course (Q2, Q2)	3.2	0.4	3, 4	3.4	0.5	3, 4	0.08
Compare to reading peer-reviewed literature (Q2, Q2)	4.2	0.8	3, 5	4.4	0.9	3, 5	0.08

Codes are based on the pre-intervention and post-intervention questionnaires of participants that finished the program, with specific question numbers in parenthesis

*Statistically significant was considered as p-value < 0.05

"This is just part of surgical practice, it should be done every day in the OR . . . we have the opportunity to reflect on that while its happening, sort of like an out of body experience… I thought it was quite unique."
"I got something out of it that was more important than what I had planned or expected; that was something that I thought, you know, is maybe one of the side benefits of doing this kind of thing."

The *coaching mindset* was also commented on by six participants:

"I adjusted the way I asked questions as a coachee and presented the information as a coach. I learned how to pay attention to the other's needs."
"It changes your mindset completely. You are there to listen and help them self-reflect, you give them tips, but the idea is to have a two-way conversation."

Preferred design and program format

Having a standardized *structure* came up five times; participants believe having an established start and finish line would be much more helpful for surgical personalities. Sample statements reflecting these sentiments included the following:

"I was very relaxed, casual, I would have liked a more like formal thing to follow the way you are asking me questions right now, it would be nice to have a bit more of structure to it."

Most participants (9/10) agreed that the *preferred location* would be the OR. However, agreement on using technology when available was also discussed and viewed positively.

"I prefer in the OR; I think it's much more useful. . . yes, it can lend itself to video, but I think the OR is definitely better."
"It made me think of all the things we could be doing remotely that we haven't even thought of… it could work out."

All participants agreed that coaching programs should be *longitudinal* in time with comments such as *"I think that it would be useful to come back and see what has happened in that respect [personal goals] after a set time"* and *"I have learned a lot, just need some repetition and to have another chance to perform with his guidance."*

Only two participants expressed that *remuneration* for time should be an important part of the design. All participants agreed they would be more likely to participate if peer coaching were eligible for CME credits with one participant stating: *"it's easier to do if it's a CME and they say you have to achieve it within one or two years... even better if they give you a detailed something that you need to be coached for a total of, let's say, 15 h in two years…".*

Participants agreed that *reciprocal interactions* should occur only when they are naturally occurring; everyone agreed that they should not be forced.

"Even if the coach does not think they are being coached, they are…"
"While in the session, I started to think, wow, I can also use everything that … is saying and reflecting on in my own work; I now understand that we both learn."
"I don't always want to coach my coach, you know; I think I can be a better coach to someone else sometimes; it's like I don't give therapy to my therapist!"

Equal training to level out the playing field was mentioned multiple times; participants agreed everyone should be trained to become a coach and be allowed to be a coach if desired.

"… it wouldn't be ok to be the coach or the coachee all the time, it goes back to only experts being able to teach you something, and who teaches them?"
"It allows you to play both roles, and that role-playing is going to force you to self-analyze and get better."

Most participants (9/10) agreed that in order to be a good *coach characteristics*, such as being a good communicator, were required. They also agreed that training is an integral part of obtaining coaching skills. Comments revolved around standardizing coaching, just like we do surgery and that we are not born with coaching skills. One participant commented on the importance of giving anyone who was interested the opportunity to become a coach, while another commented that only someone with specific criteria could be a coach.

"It's something you have to develop, the intention is to unify, so even if you have been in practice for years, we should all get the same basic training."
". . . anybody who wants to be a coach. I think it would be valuable to have a preparation for the coaching interaction that will sensitize people to some of the issues . . ."
"Maybe potential people could actually meet certain criteria. Perhaps expertise in terms of familiarity with the cases and things like that, maybe have their own outcomes published in their field, something that makes them respectable or worthy of respect."

All participants agreed they would want input in *choosing* their coach, with no participants feeling comfortable with a coach being assigned to them. Knowing the skills of the person who would coach them, even if they did not have a personal relationship beforehand, was also expressed:

"No, we should always choose."
"The problem is not someone I don't know personally, its someone I don't know of..."

The optimal *characteristics of coachees* were discussed infrequently, with only two participants commenting on this topic. Both participants agreed that coachees must be willing to be coached and receive feedback. A statement reflecting this thought was *"The coachee needs to be open to being coached; if not, it doesn't matter; it won't work."*

All participants agreed a session to establish *rapport and goals* before the start of a coaching program would be important, particularly when a "stranger is coaching you." Four participants commented on how these interactions can improve relationships among your team even if you already know and trust them. All participants agreed that, if a relationship between coach and coachee does not already exist, time to establish rapport would need to be built into the program before the coaching sessions begin.

"That first meeting is crucial, you know, making sure that the match is good and that the people are going to make it a successful interaction."
"We have only been working together for [a few] months, but after this exercise, I feel like we opened up more to each other; there is more trust and fewer communication issues."
"It's difficult, you know? Even when you work with someone closely, having a good relationship inside the OR is difficult, but I think these types of dynamics help."

Training was brought by all participants, with agreement that both coaches and coachees should receive the same training. The discussion revolved around using the tools provided, needing short videos or examples, having refresher courses, and preparing for each session. One participant commented that the amount of information provided in the coaching training session was huge and there was a recommendation that it be divided into more sessions. Almost all (8/10) participants expressed an interest in an online program that could be completed independently at one's convenience. Only one participant said that training could become another barrier because of the time commitment it entails:

"I think watching a live or video of a real session, but not done by a coach, but like by a physician, where time is limited, and it's more relevant to our lives."
"I really think having some sort of online program to prepare people, and they can go back to it, you know, having it as a reference, I think that could be useful."

One participant commented on not getting *feedback* as a coach and how important that would have been. *"I think one important thing that could help is to have the sessions recorded, and then I can get the perception from you on what things I could have done better, not from the coachee and not from my perception, but from our facilitators."*

Benefits to participation

All participants agreed that the benefits of coaching included *care evolution, enhancing patient safety, and achieving expertise*. Three participants acknowledged the technical benefits of surgical coaching and the *personal growth* and side benefits you can acquire and translate to other areas in life. Two participants agreed that coaching could be more important than other modalities.

"I think it can be more important [than a meeting] . . . with coaching you feel the progression, get your questions answered immediately, and potentially get help achieving the next step."
"Even if it's virtual, you can get so much knowledge and richness out of a one-on-one session with your peer."
"You know it's like the knowledge you gain in residency, but now nobody is your teacher; I feel it's even better."
"You know, yes, it is for the patient, but more than that, on a personal level, it's for us; we get better in every way."
"… I got things out of this I would not have been able to get from independent modalities (e.g., reading). The presence of the coach in the room really helped me reflect on my practice in ways I had not had the chance to really do previously."

Barriers

Logistical barriers to coaching participation, such as time and lack of cases, were brought up four times, including:

"I think the biggest barrier from a logistics perspective is to get two attendings to scrub in on a case where they wouldn't otherwise have to, so to manage their time, the economic issues, etc. If you take all that away, it's terrific."

Surgical culture barriers, such as feeling or being seen as incompetent, came up on two independent occasions:

"It's this tabu of if I make a mistake, then that means I am incompetent…."
"It's not that you don't know, it's that you want to be better than you already are."
"This experience reduced my fear of not knowing …"

Five participants talked about *coaching dynamics*, such as ego and hierarchical issues. Quotes expressing these sentiments included the following:

"Learn to accept and ask for help… there is nothing wrong with that."
"It's scary to tell them what I think; you know I just graduated; I have no right telling him if something can be done in another way."
"We need to eliminate hierarchy because if only someone in particular can be a coach and I am the student again, I might as well do a fellowship."

Perceived lack of need was not explicitly mentioned as a barrier, but one participant commented on learning we do not know everything after graduation. *"You have to understand that just because you graduated doesn't mean you have the absolute truth."*

Finally, participants were asked what they thought could help them avoid potential barriers, answers included the following: *"making time," "scheduling sessions in advance,"* and *"making time because you want to learn and have a good experience,' "using zoom,"* practicing with *"healthy patients or at the SIM center" and finally the idea of "exchanging roles..."*

Satisfaction

All participants agreed that the experience was positive, and they would likely participate again if a program like this were established. One participant commented they would establish a coaching program with their own team to reap the benefits. Examples of *participant satisfaction* quotes included the following:

"I found the experience enriching; it works, and we just have to accept it."
"It was good. I'm planning on doing it now, like once a month at least, even if it's just within my team."
"It's a very good method for personal and professional growth."
"It was probably more beneficial in a different way than I could have planned for."
"This project is really good; this is one of those things that I feel can really change the way we practice surgery; it would benefit us all."
"I truly had fun"

Discussion

This study describes the initial experience of a unique peer coaching program for practicing surgeons that supported autonomy, reciprocity, and bilaterality to participants. To our knowledge, this is the first study to explore reciprocity and bilaterality to improve the coaching dynamics. Interestingly, while the whole experience was rated positively, reciprocity itself was not highly valued unless it occurred organically between participant pairs. Despite this, participants felt bilaterality to be an essential feature in designing peer coaching programs in order to solve issues of hierarchy and cultural stigmas in surgery such as being perceived as "needing" coaching and thus perhaps being labeled as incompetent. In addition, all participants felt strongly they would only accept coaching from someone they knew of and respected, and all wanted to have some input in choosing their coach. Results of this pilot may be useful to guide the development of successful peer coaching programs in the future.

Participants in this study came from two countries in America with different surgical systems. Co-surgery happens in Canada primarily for "complex cases," while most Mexican surgeons almost always operate with another surgeon [13]. However, all participants agreed that, no matter the conditions in which they operate, following a structure to establish goals and receive formal feedback is not usually done in the day-to-day surgical practice and can be greatly beneficial.

The commitment to lifelong learning is an essential characteristic of surgical practice, and its main purpose is to ensure competence and quality patient care [25]. Historically, CPD modalities have been didactic and sporadic. Research has shown that traditional CPD has a high rate of knowledge acquisition. However, there is still a gap between what surgeons know and what they do, so traditional CPD may not enable long-term practice change [26, 27]. Research in the field of professional development has shown that the addition of coaching to traditional knowledge acquisition modalities can increase the rate of practice change to up to 95% [28]. The need for coaching, impact on personal relationships and clinical practice, and comparison to some CPD modalities were highly rated among participants before the program began, demonstrating that surgeons who voluntarily enrolled in this study were likely looking for an effective CPD modality that provides feedback and brings forth changes in practice.

Participants were given autonomy to structure their sessions as they needed. Interestingly, all sessions were conducted in different manners, from the OR, the hospital ward, virtually, and with video review. Although most participants preferred having sessions in the OR when possible, all were open to virtual/online coaching also. Live coaching in the OR has been reported as the preferred method by surgeons [12, 13] and allows for the development of communication, preparation, patient selection, leadership, and teaching skills that would be difficult to capture through video review alone. However, this format leads to challenges in scheduling,

credentialling, and privacy not encountered through video-based coaching. No matter the format, like with previous studies [29, 30], participant satisfaction was high with all participants reporting being likely to participate in similar initiatives in the future, demonstrating peer coaching is feasible and appealing in several different formats.

This study was designed to explore the feasibility of reciprocal peer coaching. Previous coaching programs have mostly employed a unilateral coaching dynamic whereby participants are designated as either coaches or coachees. Such a format is limited by the short supply of "experts" to serve as coaches and the potential stigma coachees may feel if they are only receiving coaching, leading them to potentially feel they have nothing to offer a peer with respect to technique or expertise. Our study gave surgeons the autonomy to choose their partners based on their established goals, in some cases peers belonged to the same clinic or hospital. The intention of this study was for peers to engage in reciprocal coaching sessions, proving that all trained participants had something to offer their peer, leveling the playing field. A previous study [15] found surgeons in coaching programs naturally alternate roles and transition to a co-learner dynamic, indicating a bilateral exchange of ideas is perhaps more comfortable than dynamics in which feedback is only given in one direction. Indeed, several studies have noted the coaches often comment that they learn a great deal from the coachees, demonstrating a bilateral relationship may be both practical and desirable. However, participants in this study all felt that reciprocity is something that occurs naturally and should not be forced. Therefore, it may be more desirable to encourage all participants to serve as both coaches and coachees, but not necessarily with the same partner depending on their individual goals and skill sets. This model may also serve to reduce issues of hierarchy which can be a barrier to coaching participation [7, 15, 31, 32].

Several studies have reported surgical culture [10, 12, 33], such as fear of appearing incompetent, and logistical barriers [6] to be the most common barriers limiting surgeons' participation in a coaching program. Additionally, other studies have found that a perceived lack of need [12] and relationship dynamics [12, 34] also affect participation. We asked participants to reflect on the barriers they encountered and provide us with practical solutions. Logistical issues were the most commonly encountered barriers in this pilot, and suggestions to overcome them were as simple as scheduling a protected coaching time every month, using virtual encounters, or paying the coach for the time they spend away from the clinic. Another solution, although not directly achievable at this level, is to provide participants with CME credits for participation with an established timeline for participation. Surgical culture, perceived lack of need, and relationship dynamics were not commonly encountered in this study although they have been described as barriers in previous studies [10]. None of the participants believed their relationships would be tarnished or that their team would judge them badly for receiving coaching, which was probably because these participants had received training in the basic skills, accepted the coaching mindset, were motivated to participate, and understood that coaching is done for improvement not remediation. Among those who withdrew from the program, these stigmas were not cited as reasons for withdrawal either, although participants might not acknowledge these fears to the research team even if they were present. Based on the responses to semi-structured interview questions, the coaching training and autonomy to choose one's own study partner seemed important to avoid hierarchical and cultural barriers to participation reported in other studies [33]. Creative solutions for surgeon buy-in and non-punitive approaches will be necessary to solve the perceived lack of need.

Limitations of this study include the small number of participants; however, as this was a pilot study to test the feasibility of the program model, enrollment was intentionally kept to no more than six pairs. The COVID-19 pandemic negatively impacted the study in several ways, including delaying completion by nearly 12 months. Nevertheless, changes to the study protocol to expand enrollment beyond the home institution and to allow virtual/remote coaching allowed us to overcome these challenges and complete the study. The responses and preferences of participants in this study may not reflect those of all surgeons, as participation was voluntary and subjects were therefore motivated to participate and thus more likely to rate the program favorably. However, responses of participants in this study mirror those reported by other studies of surgeons in general [12, 13] and therefore the opinions reported here can be relied upon to benefit future coaching program design. Additionally, this pilot was a peer coaching program for the improvement of a skill. Therefore, the findings here may not be translatable to coaching programs geared toward acquiring new skills. Finally, the reaction of staff and the feelings of the surgeon to being coached in front of them was not directly measured but could be a barrier to participation. Future studies should address how teams and patients feel about the surgeon receiving coaching.

Conclusion

This pilot study supports the feasibility and acceptability of a peer coaching model for surgeons in practice that emphasized reciprocity and participant autonomy. These key elements should be considered when designing future coaching programs.

Appendix 1

Pre-intervention questionnaire

1. How would you describe the need for a reciprocal peer coaching program for practicing surgeons? (CPD = continuous professional development)

No need	Small need (*n* = 1)	Modest need (*n* = 1)	Above average need (*n* = 8)	Great need (*n* = 5)
This program fills no CPD gap and would not be useful	Almost all benefit of such program could be achieved through other CPD activities (e.g., Courses and meetings.)	Such a program would be a useful adjunct to other CPD activities	There are some gaps in practice refinement opportunities for practicing surgeons which such a program would help address	There are major gaps in practice refinement opportunities for practicing surgeons which such a program would address

2. How do you predict this learning activity will compare to the following traditional CPD activities?

(A) Attending a lecture by an expert in the field

Vastly inferior	Inferior	Neutral (*n* = 5)	Superior (*n* = 4)	Vastly superior (*n* = 6)

(B) Watching an edited surgical video independently

Vastly inferior	Inferior	Neutral (*n* = 4)	Superior (*n* = 9)	Vastly superior (*n* = 2)

(C) Attending a post graduate course including a hands-on component

Vastly inferior	Inferior	Neutral (*n* = 12)	Superior (*n* = 3)	Vastly superior

(D) Reading peer-reviewed literature

Vastly inferior	Inferior	Neutral (*n* = 4)	Superior (*n* = 5)	Vastly superior (*n* = 6)

3. How appealing do you personally find the idea of a reciprocal peer coaching program regarding your own practice refinement and continuing professional development?

Not at all appealing	Mildly appealing (*n* = 1)	Modestly appealing (*n* = 2)	Very appealing (*n* = 8)	Extremely appealing (*n* = 4)
Nothing about such a program entices me	I can see some merits to such a program but overall would probably not participate outside of this study	I can see some problems in implementing such a program, but overall would like to participate	While such a program would require a cultural change with respect to CPD for practicing surgeons, I would welcome this change	I would welcome such a program and eagerly participate

4. What are your motivations for participating in this program (circle all that apply)?

Find another CPD modality **(*n* = 6)**
Acquire a new skill **(*n* = 8)**
Convenience
Enhance my current skills **(*n* = 13)**
For enjoyment **(*n* = 3)**
Improvement of patient care **(*n* = 9)**
Relevance to practice **(*n* = 3)**
Other:

5. How easily do you think a reciprocal peer coaching program for practicing surgeon would be adopted by the surgical community?

Impossible	Difficult (*n* = 4)	Challenging (*n* = 9)	Fairly easy (*n* = 2)	Very Easy
The cultural changes needed to implement such a program will never happen	This would require a major change in typical surgeon behavior which will not come without a struggle	While there are some hurdles to overcome, the need for such a program would outweigh any resistance in the end	While there may be some skeptics, most surgeons would welcome such a program if it were available	I can foresee very few issues with implementing such a program

6. How would you score the universal applicability of a reciprocal peer coaching program for practicing surgeons (applicability of the peer coaching model to diverse surgical environments/specialties/etc.)?

Extremely unlikely	Unlikely (*n* = 1)	Neutral (*n* = 9)	Likely (*n* = 4)	Extremely likely
This is a very niche model that would only work under very narrow conditions	Such a program should be adapted to various settings and conditions and I would anticipate encountering many challenges	Such a program would be reasonably well adapted to various settings and conditions with some foreseeable challenges	Such a program would be easily adapted to various settings and conditions with few foreseeable challenges	Such a program could easily work under any conditions (regardless of practice patterns, location, academic, or community setting, etc.)

7. How do you think a reciprocal peer coaching program for practicing surgeons would affect interpersonal relationships among surgical colleagues?

Very badly	Badly	Neutral	Good (*n* = 8)	Excellent (*n* = 7)
It would cause nothing but fights and damage interpersonal relationships	Ultimately the damage to interpersonal relationships would be greater than the benefits	Relationships will be equally damaged and improved with no net gains or losses	There might be some small conflicts but ultimately such a program would improve interpersonal relationships	Personal relationships would be greatly improved by such a program

8. How do you **feel** knowing someone will be observing your videos and giving you feedback? (Circle all that apply)

Excited **(*n* = 5)**
Happy **(*n* = 3)**
Optimistic **(*n* = 10)**
Hopeful **(*n* = 4)**
Nervous **(*n* = 4)**
Anxious **(*n* = 3)**
Skeptical **(*n* = 1)**
Fearful **(*n* = 2)**
Angry
Ambivalent **(*n* = 1)**
Other:

9. How do you think your participation in a peer coaching program will be seen by the rest of the surgical team (trainees, nurses, anesthesiologists, etc.)?

Very badly	Badly	Neutral (*n* = 5)	Good (*n* = 7)	Excellent (*n* = 3)
I fear the team will think I am incompetent for volunteering to participate	I think the team will think my skills are weak for volunteering to participate	I think the team will not care one way or the other	I think the team will generally view my participation positively	I think the team will proud of me for being open to feedback

10. Do you think the following barriers to participation will be encountered during this study? If yes, please explain how you plan to overcome them

Barrier	YES	NO	Solution
Lack of time	9		
Lack of cases	6		
Scheduling conflicts	12		
Geographical barriers (different sites)	6		
Boredom	2		
Poor goal setting	3		
Partner incompatibility	1		
Other:	1		Hierarchy, money, environment

11. How important was being able to choose your own partner to you in deciding to participate in this program?

Not important	Slightly important	Moderately important	Very important (*n* = 12)	Extremely important (*n* = 3)
Actually, I really wish my partner had been chosen for me	I would have preferred my partner was chosen for me	It does not matter to me either way	Choosing my own partner was a benefit of the program but not mandatory	I doubt I would have participated if I had had no choice in my partner

12. How do you anticipate participation in this program will impact your **surgical practice**?

No impact (*n* = 1)	A slight impact (*n* = 1)	Somewhat of an impact (*n* = 3)	Moderate impact (*n* = 7)	Great impact (*n* = 3)
I expect participation in this program will not impact my practice whatsoever	I doubt participating in this program will meaningfully impact my practice, but I might learn one or two new useful things	I anticipate learning a few new things which I might incorporate into my surgical practice	I anticipate learning several new things which I look forward to incorporating into my surgical practice	I anticipate learning a great deal and expect my surgical practice to change greatly as a direct result

13. How likely are you presently to ask your study partner for advice or feedback regarding your surgical practice?

Never (*n* = 1)	Rarely (*n* = 1)	Sometimes (*n* = 2)	Often (*n* = 8)	Routinely (*n* = 3)
I have never and probably would never ask him/her for advice or feedback; we do not discuss our surgical practice	I might ask him/her for advice or feedback but only if I were really stuck	I sometimes ask him/her for advice and feedback; I know he/she would be there if I needed it, but I usually approach others first	I often ask him/her for advice and feedback; it's not a routine occurrence but he/she is one of my go to people when I need it	I routinely ask him/her for advice and feedback; we have a very open collegial relationship and he/she helps me a great deal

14. How useful did you find the goal-setting exercise in focusing your personal objectives for this program?

Useless	Almost useless	Neutral (*n* = 4)	Helpful (*n* = 2)	Very helpful (*n* = 9)

15. How would you rate the Orientation Workshop? (with the coach, January 2020)

	Very bad	Bad	Neutral	Good	Excellent
Content			3	6	5
Facilitator			2	7	5
Time commitment			3	8	4
Usefulness			3	6	5

Appendix 2

Post-intervention questionnaire

1. After your experience how would you describe the need for a reciprocal peer coaching program for practicing surgeons?

No need	Small need	Modest need	Above average need	Great need
This program fills no CPD gap and would not be useful	Almost all benefit of such program could be achieved through other CPD activities (e.g., Courses and meetings)	Such a program would be a useful adjunct to other CPD activities	There are some gaps in practice refinement opportunities for practicing surgeons which such a program would help address	There is a major gap in practice refinement opportunities for practicing surgeons which such a program would address

2. How did this learning activity compare to the following traditional CPD activities?

(A) Attending a lecture by an expert in the field

Vastly inferior	Inferior	Neutral	Superior	Vastly superior

(B) Watching an edited surgical video by yourself

Vastly inferior	Inferior	Neutral	Superior	Vastly superior

(C) Attending a post graduate course including a hands-on component

Vastly inferior	Inferior	Neutral	Superior	Vastly superior

(D) Reading peer-reviewed literature

Vastly inferior	Inferior	Neutral	Superior	Vastly superior

3. After your experience how easily do you think a reciprocal peer coaching program for practicing surgeon is going to be implemented?

Impossible	Difficult	Challenging	Fairly easy	Very easy
The cultural changes needed to implement such a program will never happen	This would require a major change in typical surgeon behavior which will not come without a struggle	While there are some hurdles to overcome the need for such a program would outweigh any resistance in the end	While there may be some skeptics most surgeons would welcome such a program if it were available	I can foresee very few issues with implementing such a program

4. After your experience how has your relationship among surgical colleagues and your study partner been affected?

Very badly	Badly	Neutral	Good	Excellent
My interpersonal relationships have been damaged beyond repair	The damage to interpersonal relationships was greater than the benefits	There was no change to my interpersonal relationships	We had some conflicts, but we could manage and a program like this can improve relationships in the workplace	My interpersonal relationships were improved after participating in this program

5. How did you **feel** while having your partner observe your video and give you feedback?

Excited
Happy
Optimistic
Hopeful
Nervous
Anxious
Skeptical
Fearful
Angry
Ambivalent
Other:

6. Do you feel having a first session to establish goals and talk to your partner helped ease your feelings? Why?

7. Did these feelings change when you were the one coaching and not getting coached? How?

8. Do you think a program like this could be reproducible?

Extremely unlikely	Unlikely	Neutral	Likely	Extremely likely
This is a very niche model that would only work under very narrow conditions	Such a program could be adapted to various settings and conditions with difficulty	Such a program would be reasonably well adapted to various settings and conditions with some foreseeable challenges	Such a program would be easily adapted to various settings and conditions with few foreseeable challenges	Such a program could easily work under any conditions (Regardless of practice patterns, location, academic or community setting, etc.)

9. How did participation in this program impact your surgical practice?

No impact	A slight impact	Somewhat of an impact	Moderate impact	Great impact
Participation in this program did not impact my practice whatsoever	Participating in this program did not meaningful impact my practice but I did learn one or two new useful things	I learned a few new things through participating in this program which I might incorporate into my practice	I learned several new things through participating in this program which I look forward to incorporating into my surgical practice	I learned a great deal through participating in this program and expect my surgical practice to improve greatly as a direct result

10. After participating in this program, how likely are you to ask your study partner for advice or feedback in your surgical practice in the future?

Never	Rarely	Sometimes	Often	Always
I would still never ask him/her for advice or feedback	I might ask him/her for advice or feedback but only if I were really stuck	I might occasionally ask him/her for advice and feedback but would still approach others first	I would sometimes ask him/her for advice and feedback; he/she would be one of my go to people when I need it	I will routinely ask him/her for advice and feedback; I feel there are a valuable resource

11. What is your overall satisfaction with this reciprocal peer coaching pilot program?

Not at all satisfied	Slightly satisfied	Moderately satisfied	Very satisfied	Extremely satisfied
Thank you for inviting me to participate but I found it to be a waste of time	I am mildly satisfied with this program but do not believe I will participate again in the future	I am honestly satisfied with this program and may or may not participate again in the future	I am quite satisfied with this program and probably will participate again in the future	I am highly satisfied with this program and will definitely participate again in the future

12. According to previous research some barriers to peer coaching are logistical (like time, geography, availability, insurance, and privileges), do you think this virtual reciprocal peer coaching program eliminates those barriers?

Yes	No

13. If this kind of program was to become another CPD modality, what would be your motivations for participating? (check all that apply)

Convenience
For enjoyment
To enhance my current skills
Improvement of patient care
Relevance to practice
Cost compared to other CPD modalities
Acquire a new skill
Other:

14. Were the following barriers encountered during this study? If yes, please explain how you managed them

Barrier	YES	NO	How did you manage them
Lack of time			
Lack of cases			
Scheduling conflicts			
Geographical barriers (different sites)			
Boredom			
Poor goal setting			
Partner incompatibility			
Other:			

15. Were your expectations met?

Yes	No

Why?
16. Did you find the experience valuable?

Yes	No

Why?
17. Did you enjoy being a coach/coachee?

Yes	No

Why?
18. Would you participate in more initiatives like these?

Yes	No

Why?

Appendix 3

Reciprocal peer coaching for practicing surgeons (coach)

Please complete the survey below

Thank you!

Date of session

What were the goals for this session?

Did the COACHEE reach their goal(s)?

What was the coachee struggling with that prevented them from achieving their goal(s) before this session?

According to you, what does the COACHEE think they should improve?

What concrete steps did you take to provide feedback to reach the COACHEEs goal(s)?

What steps do YOU think the COACHEE should take to reach their goal(s)?

Did you feel that the COACHEE experienced any learning barriers (fears, anxiety, fixed mindset, etc.) that impeded their progress? Yes/No

Please explain

How did you feel during your role as a COACH (anxious, calm, happy, bored, etc.)? Please tell us why you felt this way.

Based on coachee feedback, is there something you could improve? Yes/No

Please explain

What do you think you did well as a coach?

What do you think you could improve as a coach?

What was the most meaningful thing you learned/gained? (Please be as specific as possible, i.e., skills, non-technical skills, and communication)

What else did you learn/gain during this session that you would like to comment on? (Please be as specific as possible, i.e., skills, non-technical skills, and communication)

Do you have something else to comment on?

Reciprocal peer coaching for practicing surgeons (coachee)

Please complete the survey below

Thank you!

Date of session

Why did you choose your partner? (Please be as specific and descriptive as possible, i.e., friend, expert, and non-judgmental) If you did not choose your partner but got chosen by someone, what would you look for if you looked for a coach?

What were the goals for this session?

Did you reach your goal(s)? Yes/No

Why? (Please provide as much detail as possible, i.e., work in progress and reestablishment of goals)

What was the most meaningful thing you learned/gained? (Please be as specific as possible, i.e., skills, non-technical skills, and communication)

What else did you learn/gain during this session that you would like to comment on? (Please be as specific as possible, i.e., skills, non-technical skills, and communication)

What do you think your coach did well during this session?

What do you think your coach could do to improve their coaching?

What do you think you did well as a coachee?

What could you do to improve as a coachee?

Do you have something else to comment on?

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