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Review

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Mentorship and early career mentorship

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Abstract

Mentorship is important for the personal and professional development of a surgeon. Surgical mentoring includes technical and non-technical skills necessary for clinical activities, career improvement, leadership acquisition and research development. Mentors are important in different phases of surgical career, conferring various forms of support. The most delicate period for a surgeon is the transition between the role of trainee and physician, and the first few years are crucial to the trajectory of future career. While in the past, the main limitation for mentorship opportunities was the lack of available mentors at a single institution, more recently, long-distance mentorship opportunities have overcome this barrier. This is of particular importance for women and underrepresented minorities in surgery, who benefit the most from same gender and same ethnicity role model. Furthermore, having the opportunity to establish productive relationships with mentors from other institutions and/or countries will prevent the possibility of leading to dependence between mentee and mentor within a single institution. This review aims to investigate different forms of mentorships, with a specific interest in early career support, long-distance mentorship and opportunities for underrepresented minorities in surgery.

Keywords: Mentorship, early career mentorship, telementoring, long-distance mentoring

INTRODUCTION

The term "mentor" takes its origin from the Odyssey. When the Greek king, Odysseus, left for the Trojan

War, he left his close friend Mentor to raise his son Telemachus into adulthood[1]. The word "mentor" was thendescribed in the English language in 1750 and is currently defined in the Oxford Dictionary as a "person who offers support and guidance to another one".

Mentorship in surgery is important during different stages of surgical career and provides different forms of support, including technical and non-technical skills. Mentoring relationships can be classified as informal or formal[2,3]. Informal mentoring can be defined as a spontaneous relationship between a senior and a junior colleague, with the aim to gain experience, knowledge and support. Formal mentoring is usually controlled by an organization and aims to provide support by following a structured program. Despite the well-acknowledged importance of receiving adequate support during the various stages of surgical career, mentorship programs are not widely distributed in surgical departments[4].

Mentorship in surgery has been recognized to significantly contribute to career satisfaction, inclusion and retention, and have a favorable effect on implementing research productivity and achieving personal development[5-13].

While mentorship relationships were created within an institution in the past, the increased use of technology and online platforms have provided the opportunity to build meaningful relationships with experienced colleagues worldwide[14,15]. This is of particular importance for women belonging to underrepresented minorities, who might benefit from senior mentors sharing similar gender and ethnical background[16].

Same-gender mentorship seems to play an important role during medical school and the early phase of surgical career, where close relationships with mentors with similar characteristics might overcome the reluctance to pursue a surgical career[16]. Georgi *et al.* demonstrated the efficacy of a structured mentoring program conducted with same-gender role models in changing female medical students' and junior doctors' perceptions of women in surgery[16].

Artificial intelligence (AI) can be defined as the study of algorithms that give machines the ability to reason and perform cognitive functions such as problem-solving, object and word recognition, and decision-making. AI has different applications in surgery, including pre-operative planning, intraoperative guidance and surgical robotics. An additional application of AI is the possible application to improve surgical mentorship, facilitating communication between mentors and mentees from different institutions.

Acknowledging this, this review summarizes available literature describing the importance of mentorship during different phases of surgical career, the possibility of receiving career support from senior colleagues and new initiatives recently developed to provide structured support and also focuses on the importance of long-distance mentorship and telementoring as possible means to provide support and guidance to future generations of surgeons.

MENTORSHIP IN DIFFERENT PHASES OF SURGICAL CAREER

Mentorship has been widely acknowledged to play a crucial role during three distinct phases of surgical career: surgical training, the transition from trainee to attending in the first 3-5 years of practice and the mid-career phase[8]. From the different domains in which mentorship is required and the different needs of mentees during their surgical training and practice, the importance of having more than one mentor is demonstrated, all of whom play equally valuable roles[17,18]. This phenomenon is described as "mosaic mentoring" and involves seeking mentors to match specific and sometimes short-term personal or career

goals[19].

Mentorship during surgical training includes technical and non-technical skills[13]. Non-technical skills embrace patient assessment, decision making, the ability to organize daily activities and the understanding of how to prioritize them. Furthermore, mentors should have an active role in providing mentees access to their own networks. Technical skills are a robust component of training in surgical disciplines, and mentors who spend additional time teaching surgical procedures function as skill masters. In most surgical training programs, skill master mentors-mentees relationships have a limited time duration, secondary to surgical rotations of trainees.

One of the most important transitions in surgery is from training to the first few years of clinical practice. This period, in the absence of formal and structured support, brings considerable pressure to young attendings[8]. To overcome this delicate period, support from senior colleagues in the same department is pivotal, as well as support from organizations and specialized societies. Early years practice is not only characterized by the establishment of a new role within a department, but also by the acquisition of skills that are usually not taught during training. Young practitioners should master how to deal with complaints, litigations and possible complications, as well as learn how to assume a leadership role within their work team[7].

Mid-career surgeons have established themselves as expert practitioners; the main problem they face is how to continue to self-improve and learn new skills, in order to offer the best opportunities to their patients and colleagues[7]. Self-improvement in this phase includes both the adoption and mastering of new technical skills and the perfection of patient management; acquiring these skills might be difficult, particularly in the setting of a busy practice in peripheral institutions[7]. Finally, mid-career might be accompanied by the assumption of leadership and academic positions, for which additional training and mentorship are required[20]. Leadership in surgery entails professionalism, technical competence, motivation, innovation, teamwork, communication skills and decision-making. Leadership skills are usually not acquired by formal or mandatory courses, but developed through experience and observation, using a framework including mentoring, coaching and networking[20].

MENTORSHIP FOR WOMEN AND UNDERREPRESENTED MINORITIES IN SURGERY

Women and underrepresented minority populations in surgery are less likely to have mentors, mainly due to the paucity of people belonging to underrepresented minorities who are organized to serve as mentors[21-23]. However, this group of surgeons might benefit the most from having same-gender and same-ethnicity mentors to gain a sense of inclusion and advance their careers. Therefore, the lack of mentorship might be a major problem limiting the diversity of healthcare workforce[23].

In a recent study[24], Mahendran interviewed 35 women in surgery, including 14 faculties, 11 residents, and 10 fourth-year medical students. Twenty (57%) participants self-identified as White, 7 (20%) as Asian, 6 (17.1%) as Black, and 2 (5.7%) as Other. The aim of this research was to determine access to mentorship for women in surgery of different career levels and racial backgrounds. The results showed that access to mentorship is easier for medical students and residents rotations, while it becomes difficult to achieve for female faculty, who lack formal mentorship networks. Furthermore, the lack of formal mentorship programs penalizes women in surgery. The informal nature of seeking individual peer mentorship leaves female faculty isolated and disadvantaged compared with their male colleagues, who have many senior male colleagues with whom they can conduct activities outside of the hospital.

Some studies also reported that female medical students and residents deemed same-gender mentors to be able to act as role models, addressing gender-specific concerns regarding the pursuit of a career in surgery[25-29]. Faucett *et al.* also found a statistically significant difference between 112 men and women regarding the importance of having same-gender mentorship and 113 organizations to support women in surgery[26].

Having a supportive mentor is also crucial for female surgeons who are interested in pursuing an academic career to accomplish their goals[27]. In a survey conducted among female members of the Japan Association of Women Surgeons, 85% of respondents thought that mentorship was necessary for female surgeons to progress in their careers[30]. Participants also reported that the presence of a mentor helped them to advance in their clinical career, to stay in their job and to provide them with moral support[30].

For female faculty, same-gender mentors have not been reported to be particularly important, since senior academic surgeons already know what they want for their career, and have already had both male and female mentors during their early training. Moreover, female mentors at this stage of surgical careers are a rare finding, due to few women occupying leadership positions in surgery[24]. During the advanced phase of surgical career, mentors can be various and might probably match only specific and short-term goals, so the importance of having common characteristics, such as gender and ethnicity, is overcome by the need to share specific professional experiences[8].

Another example of gender inequalities in the field of academic surgery is the paucity of women involved in the editorial board of several surgical journals. Ehrlich *et al.* analyzed 2836 editorial board members from 42 US surgical journals and found that only 420 (14.8%) were women[31]. Of 881 associate editors, 118 (13.3%) were women and only 2/42 (4.8%) of editors-in-chief were women. Similar results have been found in Europe by Picciariello *et al.*, who analyzed the 50 top-ranked European surgical journals in 2020 according to Scimago Journal & Country Rank indicator[32]. Out of 505 associate editors, only 66 (13%) were women, as were 3/47 (6.4%) editors-in-chief. Barriers to the access of women surgeons to the editorial board of surgical journals are present both in North America and Western Europe.

Social media is an important instrument for networking, mentoring and sponsorship[14,15] among female surgeons and minorities, partially overcoming the difficulties in finding same-gender and same-ethnicity mentors within single institutions. Social media represent a modern system to create a global network and offer assistance by sharing common experiences[15], enabling a connection between people around the world. The use of social media in cardiothoracic surgery has permitted the building of a larger network of same-gender mentorship that could not have been achieved on its own[33,34]. Luc *et al.* conducted a 35-item online survey to characterize the role of social media in mentorship and networking of surgeons, with a specific interest in same-gender mentors and the role of social media in such mentorship relationships[34]. Women in surgery described their opposite-sex dominant specialties and they were usually mentored by the opposite gender in surgical specialties[34]. In surgical specialties, women were less likely than men to have access to an institutional mentoring program (32% *vs.* 56%, $P = 0.014$) and less likely to be exposed to same-gender mentorship at their own institution (43% *vs.* 91%, $P < 0.001$). Therefore, responders from surgical specialties were more likely to use social media to build a network of same-gender mentorship ($P = 0.031$).

DISTANCE MENTORSHIP AND TELEMENTORING

Distance mentorship models may focus on technical skills development, education progress and professional advancement. However, available literature in surgery particularly focuses on skill development through telementoring[35]. Several systematic reviews performed in telementoring reached the overall

conclusion that this methodology is equivalent to on-site mentoring in regard to clinical and educational outcomes[35-37].

Telementoring in surgery is a novel methodology developed in response to a need to expand technical skills for surgeons not having the possibility to attend courses or workshops in person. While telementoring has been present for over two decades, social distancing required during the Covid-19 pandemic has implemented its use[35]. Telementoring can be defined as a technique through which an experienced physician guides a less experienced physician in a remote location[38]. If this occurs intra-operatively, it is termed telesurgical telementoring and the main purpose is to improve the surgical skill of a mentee.

A variety of technologies might be used for surgical telementoring models. These include incorporated two-way audio and real-time video images and telestration[39], which the mentor could use to guide the mentee visually through the surgery. Telestration is a specific type of telementoring in which the mentor adds lines, objects or text to the screen through which the mentee receives instruction. The mentor might also remotely control electrocautery laser pointers and surgical devices[35-37]. New virtual reality technology, like the System for Telementoring with Augmented Reality (STAR), has been used to provide instruction within the mentee's visual field[40,41], while the coaxial projective imaging system can be used to project 3D images[42].

The outcome and efficacy of telementoring have been assessed in literature by comparing distance-mentored groups to in-person mentoring and no mentoring. Telementored surgeons have been reported to perform significantly better in skill assessments than non-mentored groups and improve their technical skills after telementored training[43]. Telementoring has also been proven to be an important instrument during surgical training. In a study by Ereso *et al.* surgical residents using telementoring performed significantly higher on overall performance (4.30 +/- 0.25 *vs.* 2.43 +/- 0.20; $P < 0.001$) and on individual metrics, including tissue and instrument handling, procedure speed, and anatomy knowledge ($P < 0.001$)[44]. Okrainec *et al.* also demonstrated that surgeons learning laparoscopic skills through telementoring scored significantly higher in skill assessments (440 +/- 56 *vs.* 272 +/- 95, $P = 0.001$) and were more likely to get a passing score on the laparoscopic simulator than those not utilizing it[45].

The advantages of telementoring are various. Firstly, rural and community-based physicians might have equal opportunities to access surgical specialist guidance[35,36]. Furthermore, telementoring reduces the costs related to traveling and course enrollment. Moreover, this form of training allows the operating surgeon to operate in its own environment, with collateral teaching of the whole theatre group, including scrub nurses and technicians, rather than only the single operator[35-37].

The main concern related to distance mentoring is related to patients' confidentiality, because technology leaves an inevitable digital record of information[35,37]. Unfortunately, the most commonly used software, such as Skype and WhatsApp, are also less safe in terms of privacy. For data protection, de-identification of information, use of phone calls and password protection devices should be implemented[46].

Other potential disadvantages of telementoring are high costs and technical requirements[37]. Further possible barriers to the adoption of distance mentoring for technical skills are poor video signal due to bandwidth or latency, loss or delay of transmission and poor audio quality[47,48]. Moreover, hospital licensing and credentialing might be required, creating an additional limitation to the introduction of this specific form of teaching[33-35].

STRATEGIES TO IMPLEMENT MENTORSHIP PROGRAMS

As previously mentioned, mentorship is important in different phases of surgical career. Structured mentorship programs have not been formally established in many countries; however, sporadic initiatives have been created in the form of pilot studies, with the aim to guide future structured systems. The "Mentor Match program" has been established at Geisinger medical center to implement formal mentorship in general surgery[49]. The "Mentor Match" was developed by conducting resident and faculty surveys using the six Accreditation Council for Graduate Medical Education (ACGME) core competencies of patient care, medical knowledge, communication skills, practice-based learning, system-based practice and professionalism. Surveys focused on resident areas of weakness correlating to areas in which faculty expressed subjective strength. Survey results were used to match faculty mentors with resident mentees. A survey was conducted one year after implementation to evaluate the perceived success of the match process and mentorship program. The survey response rate was 78%, with 92% of residents satisfied with the program; 83% noticed an improvement in their areas of weakness and 75% considered the match process was effective in pairing mentors with mentees.

In the UK, a new initiative from Royal College of Surgeons has been established to support physicians during their first five years. Early career consultant network (EYCN) was set up by a task force of colorectal surgeons in late 2019 to provide support for Consultants in their first five years of practice[50]. Such support would take the form of mentoring, opportunities within the profession and career progression, as well as advice on other aspects of Consultant practice, including job planning, handling complaints, inquests, litigation *etc*. The key goals of the committee are inclusivity, peer support and mentorship. EYCN identified a clear need for mentoring and developed a pilot program, where a colorectal surgeon within the first five years of experience was matched with a senior colleague from another region of the country. Meetings and events on different topics, such as technical skills and how to deal with complications and complaints, have been organized. Every year, at least two face-face meetings have been held between mentor and mentee in addition to teleconferences[50].

As previously explained, for women and ethnic minorities, it is even more difficult to find a mentor with similar characteristics to offer support. Women in Surgery Italia (WIS Italia), the Italian association of women in surgery, along with the University of Padova[51], recently presented a project aimed to help female medical students with an interest in surgery and female residents to find mentors among selected world-class institutions. The pilot project selected 25 mentors and 25 mentees and had its presentation meeting on June 29, 2022. In the future, online meetings between matched mentor and mentee will be organized with the aim to create support in training opportunities, role models, career advancement and work-life balance.

CONCLUSION

Mentorship is important during different phases of surgical career, and the availability of different mentors provides support to different aspects of the surgical profession. Furthermore, providing good mentorship to young surgeons is also important, because today's mentees will be future mentors who will support forthcoming generations of surgeons. In the past, effective mentorship was limited by the necessity to find mentors within a single institution. However, the recent development of long-distance mentorship and telementoring might overcome this obstacle, providing technical and non-technical support to surgeons all over the world. Further development of formal mentorship programs is advocated to guarantee high-level surgical education to new generations of surgeons, with special attention to women and minorities. Hopefully, we can establish a sound education system in the future that benefits everyone without an imbalance of gender, ethnicity and religion.

DECLARATIONS

Authors' contributions

Made substantial contributions to conception and design of the study and performed data analysis and interpretation: Ferrari L, Spolverato G

Performed data acquisition, as well as provided administrative, technical, and material support: Mari V, Capelli G

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Conflicts of interest

All authors declared that there are no conflicts of interest.

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Consent for publication

Not applicable.

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