Title:

**Structuring mentoring in medicine and surgery. A systematic scoping review of mentoring programs between 2000 and 2019**

Abstract

**Background**: Evidence of novice mentoring’s successes in having senior clinicians support junior doctors and/or medical students in their clinical, academic and research goals have spurred efforts to include mentoring in the core medical curriculum. However, lack of effective structuring threatens the viability of mentoring programs, precipitating ethical concerns about mentoring. This review aims to answer the question “what is known about mentoring structures in novice mentoring amongst medical students and junior doctors in medicine and surgery postings?” which will guide the design of a consistent structure to novice mentoring.

**Methods**: Levac (2010)’s framework was used to guide this systematic scoping review of mentoring programs in medicine and surgery published between 1January 2000 to 31 December 2019 in PubMed, ScienceDirect, ERIC, Embase, Scopus, Mednar and OpenGrey. A ‘split approach’ involving concurrent independent use of a directed content analysis and thematic approach was employed to analyse included articles.

**Results**: 3395 abstracts were identified. There was concordance between the 3 themes and categories identified in analysing the 71 included articles. These were the host organization, the mentoring stages and evaluations.

**Conclusion**: The data reveals the need for balance between ensuring consistency and flexibility to meet the individual needs of stakeholders throughout the stages of the mentoring process. The Generic Mentoring Framework (GMF) provides a structured approach to ‘balancing’ between flexibility and consistency in the mentoring process. The GMF is reliant upon appropriate, holistic and longitudinal assessments of the mentoring process to guide adaptations to the mentoring process and ensure effective support and oversight of the program.

**Keywords**: mentoring frameworks, mentoring structures, mentoring guidelines, medical education, medicine, surgery

Introduction

Mentoring’s ability to boost the professional, academic, research, clinical and personal development of mentors and mentees, improve patient outcomes, and enhance the reputations of the organizations hosting these mentoring programs has inspired interest in expanding mentoring’s role in medical education.1-25 Described as a “*process whereby an experienced, clinician provides holistic and longitudinal support to advance the goals and interests of a medical student or junior doctor”,*26,27 mentoring’s success depends upon three factors. This includes the process of pairing of mentees with appropriate mentors (matching), nurturing a personalised mentoring relationship between the mentee, mentor and the host organization and the presence of a supportive mentoring environment28-31 formed by the mentoring culture and mentoring structure (MS).16,28,29 Whilst knowledge about matching and the mentoring relationship continues to develop, there is little data on the MS which is tasked with the critical role of shaping, supporting and overseeing a consistent assessment and mentoring process.28,32,47

This gap in understanding is exposed by Byerley (2018)33, Singh and Singh (2018)34 and Soklaridis et al. (2018)35 who suggest that poor structuring of mentoring processes predisposes to ethical concerns surrounding mentoring use.33-35 Cheong et al. (2019)36’s and Lee et al. (2019)37’s reviews of ethical concerns surrounding mentoring use in medicine and surgery suggests that the bullying of mentees, illegitimate appropriation of mentee’s work, abuse of mentoring relationships and a failure to meet the mentee’s needs and commitment are the result of an ineffective MS. Also compromised by poor MS are mentee and mentor training, the assessment program and the provision of timely and appropriate support to stakeholders. 36,37

***The need for this review***

With MS predisposing to mentoring abuse36,37, a systematic scoping review of MS of mentoring programs involving junior doctors and medical students in undergraduate and postgraduate medicine and surgery training, clinical and research programs is proposed to evaluate “what is known of MS in novice mentoring?”.16,28,29 Data from this review also promises to guide the future structuring of mentoring programs.

Methodology

A systematic scoping review captures the breadth of available data on MS,38-44 and enhance understanding of the key characteristics of MS in novice mentoring, the dominant form of mentoring in medical education.15-20,28,32-34,45,46, Data from this systematic scoping review will form the basis for the proffering of a data-driven framework that can guide the consistent structuring of MS.41,44,47,48

Yet to outline prevailing knowledge on MS, this systematic scoping review must account for mentoring’s evolving, entwined, goal-sensitive, context-specific, mentor-, mentee-, mentoring approach-, mentoring relationship-, host organization-dependent nature (henceforth mentoring’s nature) that confines study of mentoring to similar mentoring approaches and settings.20 As a result this review will focus upon the widely used mentoring approach of novice mentoring which is employed to provide academic, research, clinical, career guidance and personal support in clinical, education and research settings.16,28,29 Novice mentoring is defined as “*a dynamic, context dependent, goal sensitive, mutually beneficial relationship between an experienced clinician and junior clinicians and/or undergraduates that is focused upon advancing the development of the mentee.”*15,16,18-21,28,30-32,45,46,49-52 With mentoring data suggesting that novice mentoring approaches and experiences are consistent across undergraduate and postgraduate medical and surgical training, in academic, research, clinical, social and personal mentoring settings and between formal and informal mentoring approaches,16,18,19 this systematic scoping review will study all these forms of novice mentoring.

Levac et al. (2010)’s adaptation of Arksey and O’Malley’s (2005) methodological framework41,53 for conducting scoping reviews was adopted to systematically study the potential size54, gaps55,56 and scope of available literature on MS in novice mentoring.53,57-59 The PRISMA-ScR checklist60 was used to develop the protocol for this study.

**Stage 1: Identifying the research question**

The primary question was “what is known about MS in novice mentoring amongst medical students and junior doctors in medicine and surgery postings?” Here students refer to undergraduate or postgraduate medical students on clinical postings or research electives in medical or surgical clerkships in British and US-style medical programs. Junior doctors refer to medical graduates (house officers, interns, residents, junior faculty) requiring some level of supervision from senior doctors (attendings, consultants, etc.)

**Stage 2: Identifying relevant studies**

Guided by medical librarians at the medical libraries by local educational experts and clinicians, the members of the research team considered population, concept and context elements (PCC elements)40,44 surrounding novice mentoring and determined the inclusion and exclusion criteria for this systematic scoping review in the PICOS format *(Table 1).*

The search strategy was finalised and included the keywords: (medicine OR medical OR clinical OR surgery) AND (mentor\* OR mentee\*) AND (frameworks OR guidelines OR structure). The same keywords were used for all the databases *(Table 1 and Figure1).*

A search of five bibliographic databases (PubMed, Embase, ERIC, ScienceDirect, Scopus) and grey literature databases (OpenGrey and Mednar) was conducted between 17 January and 14 February 2020. The search was confined to articles in English published between 1st January 2000 and 31st December 2019. Accounts of mentoring prior to 2000 were excluded as they tended to intermix distinct forms of mentoring and conflate them with coaching, supervision, role modelling, networking and tutoring.15-20,28,29

No institutional ethics approval was required.

**Stage 3: Selecting studies to be included in the review**

Guided by the established inclusion and exclusion criteria, members of the research team independently identified and reviewed titles and the abstracts of papers found in the database searches and created individual lists of articles to be studied. The research team employed ‘negotiated consensual validation’ to achieve consensus on a final list of full-text articles to be analysed.61

**Stage 4: Data characterisation and analysis**

In the absence of an *a priori* framework for mentoring and in the face of growing data that mentoring occurs in stages,49 two members of the research team adopted a directed content analysis approach62 to independently delineate the key categories from Krishna et al. (2019)’s study of novice mentoring relationships to analyse the included articles. “Negotiated consensual validation” was employed by the two members and the final author to identify 3 categories (host organization, the mentoring stages and evaluation of the mentoring process). The two members then independently coded the remaining articles61 and did not identify any new categories.49,62

Concurrently, the other three members of the research team adopted Braun and Clarke’s approach to thematic analysis63 to independently code and analyse the papers identified in Stage 3. Semantic themes were identified from categorisation of ‘detail rich’ codes on various aspects of the mentoring process.63 The three members met and discussed the themes identified to achieve consensus upon the final list of themes.61

Concurrent use of the directed content analysis62 approach and Braun and Clarke’s approach to thematic analysis63 or ‘split approach’ was adopted in anticipation of concerns about the validity of use a relatively new and thus far unverified concept of mentoring stages to guide the directed content analysis process. In addition, independent use of Braun and Clarke (2006)’s approach to thematic analysis63 enhances researcher reflexivity given that two senior members of the research team were involved in Krishna et al. (2019) publication. Use of Braun and Clarke (2006)’s approach to thematic analysis63 served as a means of confirming the evidence, as a form of triangulation and as a method of enhancing the validity of the findings64. Initial disparity between the categories and themes identified ensured a careful review of the data found by both approaches and underlined the iterative process used in analysis of the data. Concurrent employ of ‘negotiated consensual validation’ served as a means of peer debrief which further enhances the validity of the findings.61

Both teams met to discuss their findings from their respective analysis of the data to compare their findings.

**Stage 5: Collating, summarising and reporting the results**

4450 articles were retrieved from the seven databases. 3395 abstracts were reviewed, 416 full text articles were identified, and 71 articles were included in this systematic scoping review *(Figure 1).* Through ‘negotiated consensual validation’, the two independent teams determined that the themes identified using Braun and Clarke (2006)’s approach to thematic analysis63 and the categories identified using the Hsieh and Shannon (2005)’s directed content analysis62 approach were similar.

Results

The characteristics of the identified articles are shown in *Table 2*.The 3 themes/categories drawn from the ‘split approach’ were the host organization, the mentoring stages and evaluation of the mentoring process.

# The host organization

The host organisation plays a pivotal role in all aspects of the mentoring program. To beginthe host organization carries out a needs assessment and a review of the proposed program to inform its design of the mentoring program and to ensure that it is sustainable and practical.**32,65-67**

The host organization sets the goals of program which include the provision of clinical, research/academic, personal and or career guidance in clinical, academic and or research settings.46,68,69 The goals of the mentoring program help determine mentor to mentee ratios,22,70-72 which ranges from a 1:1 ratio73,74 to multiple mentors to a mentee and vice versa.23,75-78 The mentoring goals and the setting of the program also help the host organization determine the type of mentor22,46,72,74,79-85 and mentee selection46,70,71,80,86 and mentor and mentee training24,32,46,65,66,80-83,85,87-93 approaches to be used.

The host organization also determines the type of support to be afforded to the program and the stakeholders32,46,65,94, and the incentives for stakeholders for participating in the program32 which include the provision of dedicated slots in mentees/mentors’ timetable for mentoring activities,46,71 salary supplements to improve mentor retention79 and support for academic promotions and access to research support and library access.24,25,32,46,65,80,81,92,93

 The host organization is also responsible for nurturing the mentoring relationship between itself, the mentee and the mentor16,32,46,65,76,80,81,87,95-98 and a conducive mentoring culture that supports the evolving mentoring relationship.65-67,87,102 The mentoring culture is seen to include the core beliefs, values and principles to guide stakeholders in their decision making and conduct throughout the course of the mentoring program.65-67,87,102 The host organization also establishes a codes of conduct46,65-67,87,102 and sets out the roles and responsibilities of mentees and mentors66 to guide assessment and oversight of the mentoring process and relationship16,32,46,65,76,80,81,87,95-98

The host organization also structures access to support networks82,93,99-101 It also provides a means for mentees to provide feedback on their mentoring experiences,47 and facilitates access to conferences and forums101 and educational, research, clinical, academic and mentoring resources.99

# The mentoring stages

Mentoring relationships evolve in stages. Each mentoring stage builds on the success of the last and follows a chronological order underscoring the importance of structure. The pre-mentoring phase relates to recruiting and training the mentors and mentees. Matching relates to pairing like-minded mentees and mentors with common interests and goals. Preliminary meetings relate to activities leading up from the matching process to confirmation that a mentoring relationship has been established. The mentoring process relates to nurturing the mentoring relationship and the mentoring approach. *(See Figure 2: Mentoring stages)*

# Pre-mentoring

* 1. Recruitment

The pre-mentoring process introduces prospective mentees and mentors to the mentoring program and provides them with information on the mentoring approach, the various stages of the mentoring program, the mentoring culture, the codes of conduct and the roles and responsibilities of mentees, mentors and the host organization over the course of the mentoring process.46,65-67,87,102 It is also an opportunity to introduce potential mentees and mentors to the critical role of the host organization within the mentoring program and as part of their mentoring relationship.32,46,65-67,87,94,102

Awareness of the roles and responsibilities of mentees, mentors and the host organization (stakeholders), the course of the mentoring program and the support mechanisms is a pivotal aspect of recruiting and aligning expectations of mentees and mentors.46,65-67,87,102

* 1. Training

Recruited mentees and mentors are provided with training on their roles and responsibilities,66 and on mentoring, communication, conflict management and feedback skills.81,88 Training often occurs in the form of workshops that also offer participants a chance to experience and imbibe the culture of the mentoring program which include the core beliefs, values and principles that will guide stakeholder in their decision making and conduct over the course of the mentoring program.65-67,87,102

# Matching Process

The host organisation of the curriculum employed is responsible for determining the type of matching to be employed within a program.46,77,88,100

Type of matching

1. Formal matching

Formal matching sees mentors assigned to mentees by the host organization.22,25,46,66,72,75,79,84,95,98,104-108 This is based upon the mentee’s and mentor’s personality and/or interests,46,104,105 gender matching46,77,88,100 and goals15,16,24,32,46,66,78,87,97,100,103-106. The success of formal matching is not known though it has been suggested that formal matching results in successful mentoring outcomes.16,69,78,94,113

1. Informal or Mentee initiated mentoring relationships

Informal matching sees mentees approach potential mentors to initiate a mentoring relationship.32,76,87,91,100,114,115 These relationships are often based upon the mentee’s clinical, research and or academic interactions with the mentor.78,87,114,115 Some programs require the program director to approve mentee-initiated mentoring relationships.76

Some studies suggest that informal mentoring results in better mentoring experiences.16,46

1. Mixed matching

A combination of informal and formal matching have also been used to harness the purported benefits of informal and formal matching processes.16,69,78,94,109-113 In mixed matching criterion-based matching based upon personality,46,104,105 gender 46,77,88,100 and goals15,16,24,32,46,66,78,87,97,100,103-106 is used to match mentors to mentee with complementary professional and recreational interests, personalities and work styles.16,69,78,94,109-113 Based upon this process mentees are provided with a list of mentors to initiate a mentoring relationship with.16 Once the mentee has initiated the mentoring relationship with an approved mentor from the list provided, the mentoring process is initiated.16

1. Preliminary meeting

Following the matching process and prior to the commencement of the mentoring relationship, preliminary meetings allow mentors and mentees to meet in person and determine if they would like to pursue a mentoring relationship.46,73,97

During these preliminary meetings, mentees and mentors discuss and agree upon individual goals, timelines and schedules, roles and responsibilities, mentoring styles and approaches and also align expectations.16,25,32,46,65,66,69,73,81,85,87,88,98-100,105,106,116 Preliminary meetings help nurture personalised relationships16,46,81 and determine the frequency of mentoring meetings.22,32,46,65,68-73,76,87,95,96,117

Four papers65,76,79,88 reported use of signed agreements between the mentor and the mentee as a statement of their undertaking, though the benefit of this approach is not reported.

If the mentee or the mentor does not wish to pursue a mentoring relationship, then the host organization will match the mentee to other potential mentors. 46,73,97

# Mentoring Process

The mentoring process pivots upon developing effective mentoring relationships.16,32,46,65,76,80,81,87,95-98 An effective mentoring relationship would entail the mentor adapting to the individual goals and needs of the mentee118, strategic advising, unselfish attitudes from the mentor as well as engagement with diverse mentees120. The mentoring goals, setting and context determines the mentoring approach.119,120

The duration of mentorship varies depending on the needs, motivations, availabilities of the stakeholders46,66, and the level of academic, research, clinical, social and personal support required to achieve the mentoring goals, their mentoring dynamics116 and on the mentoring setting and goals. 16,32,46,65,76,80,81,87,95-98

Mentoring approaches also differed when considering skills training and the training context.In surgery Burlew (2017)121 described use of the Halstedian training model of “see one, do one, teach one” as part of their mentoring process. This approach begins with the mentor briefing the mentee on the procedure.119-121 This is followed by the mentee observing as the mentor demonstrates the procedure and then preforming the procedure under the guidance.121 Similar to coaching, the mentee repeats the procedure under supervision and with timely, appropriate, personalised, specific, holistic and sometimes longitudinal feedback until the mentee has mastered the procedure.121 Neither Burlew (2017)121 nor Birch et al. (2007)122 explain how this aspect of surgical mentoring differs from traditional coaching or supervision.

In contrast there were no accounts of use of the Halstedian training model in mentoring in medical specialities.

# Evaluation of the mentorship process

Only 30 of the 71 included articles proffered an evaluation of the mentoring program, mentoring approach, mentoring relationships OR mentoring progress.16,22,23,65,68-70,72-74,76,79,80,84,85,88,91,92,95,97,98,100,104,107,108,123-127 Only one considered the input of all three stakeholders.123

1. Evaluation of mentees by mentors

Assessments in the form of annual activity reports and feedback,65 case reports72 and ‘holistic’ evaluations123 were used to facilitate mentee development.16,23,65,68,72,85,100,123

1. Evaluation of mentors by mentees

Two papers73,76 used the Mentorship Effectiveness Scale to evaluate the support and characteristics of the mentor while Fish (2005) employed a general review of the effectiveness of mentoring.123 Six other papers69,70,79,91,126,127 did not specify the particular assessment approach employed.

1. Evaluation of the mentorship programme

Programme evaluations take the form of face-to-face interviews, mentor and mentee journals, reflection sheets, questionnaires, workshops, focus groups to discuss mentoring experiences.22,68,69,73,74,76,80,84,88,92,95,97,98,100,104,107,108,123-125 A combination of Likert-scales, open-ended questions and feedback on the level of satisfaction in the program, potential negative aspects and suggestions for future mentoring programmes have been employed.104

**Stage 6: Consultations with key stakeholders**

When the findings in Stage 6 were considered in totality, the utility of the ‘split approach’ and use of an iterative review of the results to determine initial inconsistencies between the results was evident.

Discussion

In answering its primary research question as to what is known about MS in medicine and surgery, the data suggests 4 important findings. These were the critical role of the host organization, the mentoring stages, balance between flexibility or personalization and structure or consistency and the lack of assessments tools.

# The host organization

This is the first account that we are aware of that discusses the central role of the host organization within the design, support and oversight of the mentoring program, the mentoring relationship and the mentoring outcomes.16,28

Unfortunately, there is no data on how the host organization forms or functions nor how it is appraised and supported, underlining the need for systematic reviews to study the role of the host organization in the mentoring process.

# The mentoring stages

The presence of mentoring stages underlines the influence of MS upon the mentoring process. The original concept of mentoring stages mirrored the research process they were drawn from Krishna et al. (2019)49 yet the data suggests that similar stages are apparent in the clinical setting, especially in the skills training process.121 As a result structuring of the mentoring stages is the product of these phases rather than effect of the MS.

Ensuring consistent progress through the pre-mentoring, matching, preliminary meeting and the mentoring process also hints at other functions of MS. These includes guiding mentee46,70,71,80,86 and mentor selection22,46,72,74,79-85 and training,24,32,46,65,66,80-83,85,87-93 establishing codes of conduct and effective evaluation,22,68,69,73,74,76,80,84,88,92,95,97,98,100,104,107,108,123-125 directing timely holistic and longitudinal support by the host organization,32,46,65-67,87,94,102 and influencing the policing of conduct and progress of stakeholders.16,32,46,65,76,80-82,87,93,95-101

With each stage of the mentoring process building on the success of preceding stages, Krishna et al. (2019) suggests that mentoring is a competency-based process.49 MS aids assessment of each stage to ensure that mentees achieve the required goals, acquire the skills needed and attain the necessary competencies to progress to the next stage of the mentoring process. Structuring is also important because the initial mentoring stages are goal-driven whilst the latter stages are competency-based, underscoring the need for regular, adaptable, ‘fit for purpose’ mentoring assessments to contend for the changes in overall goals of the mentoring stages. These regular structured assessments aid in guiding the review and oversight of the mentoring process.65,76,79,88

Yet with each mentoring relationship being unique, MS must be sufficiently flexible to meet the specific needs of the mentoring process, relationship and stakeholders whilst ensuring that a consistent mentoring approach is adopted and that practice conforms with the program’s codes of conduct, professional codes of practice and institutional ethical and professional codes (henceforth codes of practice or CoP). This highlights the importance of ‘balance’ within MS.

# Balance in MS

‘Balance’ within MS sees the embrace of flexibility to contend with the unique nature of each mentoring relationships and yet maintain consistency in the mentoring approach to ensure that the appropriate levels of knowledge and skills for each stage have been acquired and that the specific goals of the particular stage have been achieved. 16,32,46,76,87,91,100,113-115 With personalization of the mentoring approach key to successful mentoring processes,16,32,46,76,87,91,100,113-115 MS must cater to the individual goals, needs, abilities, availabilities and competencies of stakeholders, attend to the practice settings and goals of the project, recognize the level of support required for each stakeholder in the particular mentoring projects,16,32,46,76,87,91,100,113-115 support and oversee the matching approach adopted,15,16,22,24,25,32,46,66,69,72,75-79,84,87,88,91,94,95,97,98,100,103-115, the frequency of meetings,22,32,46,65,68-73,76,87,95,96,117 and the mentee to mentor ratio.22,23,70-78

However, whilst there is little detail on the process of personalization, it can be surmised that in order to prevent infringements in prevailing practice standards, CoPs act to inform stakeholders of breaches in practice and guide host organizations in policing potential abuse of mentoring processes65,76,79,88 thus confining personalization of the mentoring process within acceptable parameters. CoPs also help host organizations align expectations, employ effective assessments and police mentoring relationships, processes and structure.65,76,79,88

To overcome concerns about confidentiality and trust with the use of formal assessments, MS directs organizations to form oversight committees to oversee individual mentoring relationships, evaluate mentee and mentor feedback and assessments of one another, address concerns raised early, diplomatically and discretely so as not to jeopardize the mentoring relationship.

MS also ensures consistency within the mentoring practice particularly during the apparent waning of the influence of MS in the latter stages of the mentoring process 15,16,18-21,28,29,45,46,51,52 by relying upon the core values, beliefs and principles within the mentoring culture instilled in the earlier more structured stages of the mentoring process.30 This reiterates the importance of the structuring and assessing the mentoring stages and ensuring that knowledge, skills and goals are acquired in a timely and appropriate manner.

# Assessing mentoring

Efforts to study and assess mentoring holistically are hindered by the complexities posed by mentoring’s nature. This has meant that mentoring continues to be studied in ‘bite-size chunks’ characterized by focused reviews or ‘deep dives’ into specific aspects of the mentoring process and targeted assessments of different aspects of the mentoring process usually from the perspective of one stakeholder. As a result, 8 articles provide focused data on assessments of mentees by mentors,16,23,65,68,72,85,100,123 9 detail evaluations of the mentor by the mentee69,70,73,76,79,91,123,126,127 and 20 focus upon evaluation of the mentoring program.22,68,69,73,74,76,80,84,88,92,95,97,98,100,104,107,108,123-125 Only one article considered input all three main stakeholders.123

With limited understanding of novice mentoring and a lack of effective and holistic assessments of MS, it comes as no surprise that novice mentoring programs are seen as ill-prepared to adjust to changes in the mentoring process, context, stakeholder and environment-related factors. They also become ill-suited to provide effective, personalised, holistic and longitudinal support to stakeholders and their respective mentoring relationships and ill-equipped to identify breaches in a multifaceted mentoring process that is influenced by an evolving mentoring culture, setting, context and environment as well as by the individual stakeholder’s availability, motivations, attitude and ability. These gaps serve to restate prevailing concerns that poor understanding of the mentoring process gives rise to poor structuring of the mentoring process which in turn compromises effective assessments of the mentoring process and invites the possibility of breaches to the mentoring process and the possibility of mentoring abuse.36,37

These gaps then underline the need to standardise the mentoring approach and better structure the mentoring process. Combining the findings of this study with those of Tan et al. (2018)’s Mentoring Framework,28 it is possible to proffer an evidence-based framework to enhance the accountability, transparency and oversight of the mentoring process and attenuate the concerns about potential mentoring abuse. The Generic Mentoring Framework (GMF) (Table 3) is designed to guide mentoring programs in undergraduate and postgraduate mentoring programs in medicine and surgery for medical students and junior doctors.128 However, to effectively contend the constant tension between the need for structure and flexibility, GMF must be inculcated with prevailing clinical, policy, sociocultural, economic, financial, education and research considerations.

Limitations

While it is reassuring that there is consistency in prevailing mentoring structures made visible in the clearly demarcated stages which helps comparisons and reassures reviewers of the similarities between the frameworks being reviewed, there are a number of limitations to be addressed.

One, drawing conclusions from a small pool of papers published in English or had English translations led to North American and European-centric perspectives and potentially limiting the applicability of our findings in wider healthcare settings.

Two, continued conflation of terms complicates prevailing understanding of mentoring. This is evident in Burlew (2017)’s account of the Halstedian training model that is applied within the mentoring context.121 On the surface, the Halstedian training model is traditionally associated with supervision or coaching and not with mentoring.121 Its inclusion within descriptions of mentoring suggests variability in the understanding of mentoring and continued intermixing of terms.

Three, despite our efforts to carry out our searches independently and then consolidate our findings, the scope and number of articles included may still mean that we may have omitted important articles.

Further Research

The GMF is built on this systematic scoping review’s successful addressing of its primary research questions. However, whilst the GMF helps structuring mentoring processes, it is incomplete without input from contextually sensitive and longitudinal assessments tools that can not only evaluate the mentoring process and the mentoring relationship but also take into account the mentoring environment and the mentoring culture.

This then must be the direction for future research if novice mentoring is to take its rightful place in medical education.

Lessons for Practice

1. Mentoring programs develop in stages, which each stage building on the works of the stage before.
2. Mentoring programs need to pivot on a balance between structure that ensures compliance with acceptable codes of practice as well as flexibility to meet individualised needs and goals. The Generic Mentoring Framework provides practical advice on directing this ‘balance’ between consistency and flexibility.
3. The development of holistic and longitudinal assessment tools to evaluate mentoring processes is required to ensure effective oversight within the mentoring program.

Legends for Figures

**Figure 1. PRISMA Flowchart** – Search terms and exclusion criteria to derive the final 71 articles to be studied.

**Figure 2. Mentoring Stages** – The mentoring process itself is made up of 4 different stages (pre-mentoring, matching process, preliminary meetings and mentoring process. Assessments and evaluations are carried out throughout all 4 stages.

References

1. Alleyne SD, Horner MS, Walter G, Hall Fleisher S, Arzubi E, Martin A. Mentors' perspectives on group mentorship: a descriptive study of two programs in child and adolescent psychiatry. *Academic Psychiatry.* 2009;33(5):377-382.

2. Andre C, Deerin J, Leykum L. Students helping students: vertical peer mentoring to enhance the medical school experience. *BMC Reseach Notes.* 2017;10(1):176.

3. Buddeberg-Fischer B, Vetsch E, Mattanza G. Career support in medicine - experiences with a mentoring program for junior physicians at a university hospital. *Psycho-social medicine.* 2004;1:Doc04.

4. Bussey-Jones J, Bernstein L, Higgins S, et al. Repaving the road to academic success: the IMeRGE approach to peer mentoring. *Academic Medicine.* 2006;81(7):674-679.

5. Chen MM, Sandborg CI, Hudgins L, Sanford R, Bachrach LK. A Multifaceted Mentoring Program for Junior Faculty in Academic Pediatrics. *Teaching and Learning in Medicine.* 2016;28(3):320-328.

6. Files JA, Blair JE, Mayer AP, Ko MG. Facilitated peer mentorship: a pilot program for academic advancement of female medical faculty. *Journal of Women's Health* 2008;17(6):1009-1015.

7. Fleming GM, Simmons JH, Xu M, et al. A facilitated peer mentoring program for junior faculty to promote professional development and peer networking. *Academic Medicine.* 2015;90(6):819-826.

8. Kashiwagi DT, Varkey P, Cook DA. Mentoring programs for physicians in academic medicine: a systematic review. *Academic Medicine.* 2013;88(7):1029-1037.

9. Lewellen-Williams C, Johnson VA, Deloney LA, Thomas BR, Goyol A, Henry-Tillman R. The POD: a new model for mentoring underrepresented minority faculty. *Academic Medicine.* 2006;81(3):275-279.

10. Lord JA, Mourtzanos E, McLaren K, Murray SB, Kimmel RJ, Cowley DS. A peer mentoring group for junior clinician educators: four years' experience. *Academic Medicine.* 2012;87(3):378-383.

11. Pololi LH, Evans AT. Group Peer Mentoring: An Answer to the Faculty Mentoring Problem? A Successful Program at a Large Academic Department of Medicine. *Journal of Continuing Education in the Health Professions.* 2015;35(3):192-200.

12. Pololi LH, Knight SM, Dennis K, Frankel RM. Helping medical school faculty realize their dreams: An innovative, collaborative mentoring program. *Academic Medicine.* 2002;77(5):377-384.

13. Singh, Singh N, Dhaliwal U. Near-peer mentoring to complement faculty mentoring of first-year medical students in India. *Journal of educational evaluation for health professions.* 2014;11:12.

14. Welch JL, Jimenez HL, Walthall J, Allen SE. The women in emergency medicine mentoring program: an innovative approach to mentoring. *Journal of Graduate Medical Education.* 2012;4(3):362-366.

15. Toh YP, Lam B, Soo J, Chua KSL, Krishna LKR. Developing Palliative Care Physicians through Mentoring Relationships. *Palliative Medicine & Care: Open Access.* 2017;4(1):1-9.

16. Sng JH, Pei Y, Toh YP, Peh TY, Neo SH, Krishna LKR. Mentoring relationships between senior physicians and junior doctors and/or medical students: A thematic review. *Medical teacher.* 2017;39(8):866-875.

17. Yeam CT, Loo TWW, Ee HFM, Kanesvaran R, Krishna LKR. An Evidence-Based Evaluation of Prevailing Learning Theories on Mentoring in Palliative Medicine. *Palliative Medicine & Care: Open Access.* 2016;3(1):1-7.

18. Wu J, Wahab MT, Ikbal MFBM, Loo TWW, Kanesvaran R, Krishna LKR. Toward an Interprofessional Mentoring Program in Palliative Care - A Review of Undergraduate and Postgraduate Mentoring in Medicine, Nursing, Surgery and Social Work. *Journal of Palliative Care & Medicine.* 2016;06(06):1-11.

19. Wahab MT, Ikbal MFBM, Wu J, Loo TWW, Kanesvaran R, Krishna LKR. Creating Effective Interprofessional Mentoring Relationships in Palliative Care- Lessons from Medicine, Nursing, Surgery and Social Work. *Journal of Palliative Care & Medicine.* 2016;06(06):1-10.

20. Loo TWW, Ikbal MFBM, Wu J, et al. Towards a Practice Guided Evidence Based Theory of Mentoring in Palliative Care. *Journal of Palliative Care & Medicine.* 2017;07(01):1-7.

21. Tan B, Toh YL, Toh YP, Kanesvaran R, Krishna LKR. Extending Mentoring in Palliative Medicine-Systematic Review on Peer, Near-Peer and Group Mentoring in General Medicine. *Journal of Palliative Care & Medicine.* 2017;07(06).

22. Kalén S, Ponzer S, Seeberger A, Kiessling A, Silén C. Longitudinal mentorship to support the development of medical students' future professional role: a qualitative study. *BMC Medical Education.* 2015;15.

23. Balmer D, D'Alessandro D, Risko W, Gusic ME. How mentoring relationships evolve: a longitudinal study of academic pediatricians in a physician educator faculty development program. *Journal of Continuing Education in the Health Professions.* 2011;31(2):81-86.

24. Rashid P, Narra M, Woo H. Mentoring in surgical training. *ANZ Journal of Surgery.* 2015;85(4):225-229.

25. Jackson VA, Palepu A, Szalacha L, Caswell C, Carr PL, Inui T. "Having the right chemistry": a qualitative study of mentoring in academic medicine. *Academic Medicine.* 2003;78(3):328-334.

26. Lin SY, Laeeq K, Malik A, et al. Otolaryngology training programs: Resident and faculty perception of the mentorship experience. *Laryngoscope.* 2013;123(8):1876-1883.

27. Ochroch EA, Eckenhoff RG. The role of mentoring in aiding academic integrity. *Anesthesia and Analgesia.* 2011;112(3):732-734.

28. Tan YS, Teo SWA, Pei Y, et al. A framework for mentoring of medical students: thematic analysis of mentoring programmes between 2000 and 2015. *Advances in Health Sciences Education.* 2018;23(4):671-697.

29. Low CQT, Toh YL, Teo SWA, Toh YP, Krishna L. A narrative review of mentoring programmes in general practice. *Education for Primary Care.* 2018:1-9.

30. Hee JM, Yap HW, Ong ZX, et al. Understanding the Mentoring Environment Through Thematic Analysis of the Learning Environment in Medical Education: a Systematic Review. *J Gen Intern Med.* 2019.

31. Sheri K, Too JYJ, Chuah SEL, Toh YP, Mason S, Radha Krishna LK. A scoping review of mentor training programs in medicine between 1990 and 2017. *Medical education online.* 2019;24(1):1555435.

32. Sawatsky AP, Parekh N, Muula AS, Mbata I, Bui T. Cultural implications of mentoring in sub-Saharan Africa: a qualitative study. *Medical education.* 2016;50(6):657-669.

33. Byerley JS. Mentoring in the Era of #MeToo. *Jama.* 2018;319(12):1199-1200.

34. Singh TSS, Singh A. Abusive culture in medical education: Mentors must mend their ways. *Journal of Anaesthesiology Clinical Pharmacology.* 2018;34(2):145-147.

35. Soklaridis S, Zahn C, Kuper A, Gillis D, Taylor VH, Whitehead C. Men's Fear of Mentoring in the #MeToo Era - What's at Stake for Academic Medicine? *New England Journal of Medicine.* 2018.

36. Cheong CWS, Chia EWY, Tay KT, et al. A systematic scoping review of ethical issues in mentoring in internal medicine, family medicine and academic medicine. *Adv Health Sci Educ Theory Pract.* 2019.

37. Lee FQH, Chua WJ, Cheong CWS, et al. A Systematic Scoping Review of Ethical Issues in Mentoring in Surgery. *J Med Educ Curric Dev.* 2019;6:2382120519888915.

38. Du Mont J, Macdonald S, Kosa D, Elliot S, Spencer C, Yaffe M. Development of a comprehensive hospital-based elder abuse intervention: an initial systematic scoping review. *PloS one.* 2015;10(5):e0125105.

39. Horsley T. Tips for Improving the Writing and Reporting Quality of Systematic, Scoping, and Narrative Reviews. *The Journal of continuing education in the health professions.* 2019;39(1):54-57.

40. Peters M, Godfrey C, McInerney P, Soares C, Khalil H, Parker D. The Joanna Briggs Institute reviewers' manual 2015: methodology for JBI scoping reviews. 2015.

41. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. *Implementation Science.* 2010;5:69.

42. Samaan Z, Mbuagbaw L, Kosa D, et al. A systematic scoping review of adherence to reporting guidelines in health care literature. *Journal of Multidisciplinary Healthcare.* 2013;6:169-188.

43. Mueller M, D'Addario M, Egger M, et al. Methods to systematically review and meta-analyse observational studies: a systematic scoping review of recommendations. *BMC Medical Research Methodology.* 2018;18(1):44.

44. Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. *International Journal of Evidence-Based Healthcare.* 2015;13(3):141-146.

45. Yap H, Chua J, Toh Y, Choi H, Mattar S. Thematic review of mentoring in occupational therapy and physiotherapy between 2000 and 2015, sitting occupational therapy and physiotherapy in a holistic palliative medicine multidisciplinary mentoring program. *Journal of Palliative Care and Pain Management.* 2017;2(1):1-10.

46. Ikbal MFBM, Wu J, Wahab MT, Kanesvaran R, Krishna L. Mentoring in Palliative Medicine: Guiding Program Design through Thematic Analysis of Mentoring in Internal Medicine between 2000 and 2015. *Journal of Palliative Care & Medicine.* 2017;7(5):1-10.

47. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Med Res Methodol.* 2018;18(1):143.

48. Tricco AC, Lillie E, Zarin W, et al. A scoping review on the conduct and reporting of scoping reviews. *BMC Medical Research Methodology.* 2016;16:15.

49. Krishna L, Toh YP, Mason S, Kanesvaran R. Mentoring stages: A study of undergraduate mentoring in palliative medicine in Singapore. *PloS one.* 2019;14(4):e0214643.

50. Chong JY, Ching AH, Renganathan Y, et al. Enhancing mentoring experiences through e-mentoring: a systematic scoping review of e-mentoring programs between 2000 and 2017. *Adv Health Sci Educ Theory Pract.* 2019.

51. Lin J, Chew YR, Toh YP, Krishna LKR. Mentoring in Nursing: An Integrative Review of Commentaries, Editorials, and Perspectives Papers. *Nurse educator.* 2018;43(1):E1-E5.

52. Toh YP, Karthik R, Teo CC, Suppiah S, Cheung SL, Krishna L. Toward Mentoring in Palliative Social Work: A Narrative Review of Mentoring Programs in Social Work. *American Journal of Hospice and Palliative Medicine.* 2018;35(3):523-531.

53. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology.* 2005;8(1):19-32.

54. Chambers D, Wilson P, Thompson C, Harden M. Social network analysis in healthcare settings: a systematic scoping review. *PloS one.* 2012;7(8):e41911.

55. O'Donovan J, O'Donovan C, Kuhn I, Sachs SE, Winters N. Ongoing training of community health workers in low-income andmiddle-income countries: a systematic scoping review of the literature. *BMJ open.* 2018;8(4):e021467.

56. Colquhoun HL, Levac D, O'Brien KK, et al. Scoping reviews: time for clarity in definition, methods, and reporting. *Journal of Clinical Epidemiology.* 2014;67(12):1291-1294.

57. Thomas A, Menon A, Boruff J, Rodriguez AM, Ahmed S. Applications of social constructivist learning theories in knowledge translation for healthcare professionals: a scoping review. *Implementation Science.* 2014;9:54.

58. Mays N, Roberts E, Popay J. Synthesising research evidence. *Studying the organisation and delivery of health services: Research methods.* Vol 2202001.

59. Lorenzetti DL, Powelson SE. A scoping review of mentoring programs for academic librarians. *The Journal of Academic Librarianship.* 2015;41(2):186-196.

60. Tricco AC, Lillie E, Zarin W, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation. *Ann Intern Med.* 2018;169(7):467-473.

61. Sandelowski M, Barroso J. *Handbook for synthesizing qualitative research.* Springer Publishing Company; 2006.

62. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res.* 2005;15(9):1277-1288.

63. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology.* 2006;3(2):77-101.

64. Creswell JW, Miller DL. Determining validity in qualitative inquiry. *Theory into practice.* 2000;39(3):124-130.

65. Straus S, Sackett D. *Mentorship in academic medicine.* John Wiley & Sons; 2013.

66. Sachdeva AK, Flynn TC, Brigham TP, et al. Interventions to address challenges associated with the transition from residency training to independent surgical practice. *Surgery* 2014;155(5):867-882.

67. Fraser A. Mentoring resident doctors. *New Zealand Medical Journal.* 2004;117(1204).

68. Kibbe MR, Pellegrini CA, Townsend CM, Jr., Helenowski IB, Patti MG. Characterization of Mentorship Programs in Departments of Surgery in the United States. *JAMA surgery.* 2016;151(10):900-906.

69. Yamada K, Slanetz PJ, Boiselle PM. Perceived benefits of a radiology resident mentoring program: comparison of residents with self-selected vs assigned mentors. *Canadian Association of Radiologists Journal.* 2014;65(2):186-191.

70. Winston KA, Van Der Vleuten CPM, Scherpbier AJJA. The role of the teacher in remediating at-risk medical students. *Medical Teacher.* 2012;34(11):e732-e742.

71. Usmani A, Omaeer Q, Sultan ST. Mentoring undergraduate medical students: experience from Bahria University Karachi. *Journal of the Pakistan Medical Association.* 2011;61(8):790-794.

72. Dobie S, Smith S, Robins L. How Assigned Faculty Mentors View Their Mentoring Relationships: An Interview Study of Mentors in Medical Education. *Mentoring & Tutoring: Partnership in Learning.* 2010;18(4):337-359.

73. Schafer M, Pander T, Pinilla S, Fischer MR, von der Borch P, Dimitriadis K. The Munich-Evaluation-of-Mentoring-Questionnaire (MEMeQ)--a novel instrument for evaluating proteges' satisfaction with mentoring relationships in medical education. *BMC Medical Education* 2015;15:201.

74. Frei E, Stamm M, Buddeberg-Fischer B. Mentoring programs for medical students--a review of the PubMed literature 2000-2008. *BMC Medical Education.* 2010;10:32.

75. Jaffer U, Pennell A, Musonda P. General surgical trainee experiences of mentoring: a UK regional audit. *Journal of Surgical Education.* 2010;67(1):19-24.

76. Ogunyemi D, Solnik MJ, Alexander C, Fong A, Azziz R. Promoting residents' professional development and academic productivity using a structured faculty mentoring program. *Teaching and Learning in Medicine.* 2010;22(2):93-96.

77. Sambunjak D, Straus SE, Marusic A. A systematic review of qualitative research on the meaning and characteristics of mentoring in academic medicine. *Journal of General Internal Medicine.* 2010;25(1):72-78.

78. Sanfey H, Hollands C, Gantt NL. Strategies for building an effective mentoring relationship. *The American Journal of Surgery.* 2013;206(5):714-718.

79. Holliday EB, Jagsi R, Thomas CR, Wilson LD, Fuller CD. Standing on the Shoulders of Giants: Results From the Radiation Oncology Academic Development and Mentorship Assessment Project (ROADMAP). *International journal of radiation oncology, biology, physics.* 2014;88(1):18-24.

80. Shamim MS. Mentoring programme for faculty in medical education: South-Asian perspective. *Journal of Pakistan Medical Association.* 2013;63(5):619-623.

81. Sheikh ASF, Sheikh SA, Huynh M-H, Mohamed MA. Mentoring among Pakistani postgraduate resident doctors. *Postgraduate medical journal.* 2017;93(1097):115-120.

82. Caruso TJ, Steinberg DH, Piro N, et al. A Strategic Approach to Implementation of Medical Mentorship Programs. *Journal Of Graduate Medical Education.* 2016;8(1):68-73.

83. Lutz G, Pankoke N, Goldblatt H, Hofmann M, Zupanic M. Enhancing medical students' reflectivity in mentoring groups for professional development - A qualitative analysis. *BMC Medical Education.* 2017;17(1).

84. Cloyd J, Holtzman D, O'Sullivan P, Sammann A, Tendick F, Ascher N. Operating room assist: surgical mentorship and operating room experience for preclerkship medical students. *Journal of Surgical Education.* 2008;65(4):275-282.

85. Mellon A, Murdoch-Eaton D. Supervisor or mentor: is there a difference? Implications for paediatric practice. *Archives of disease in childhood.* 2015;100(9):873-878.

86. Dzau VJ, Soo KC. Mentorship in academic medicine: A catalyst of talents. *Annals of the Academy of Medicine Singapore.* 2015;44(7):232-234.

87. Flint JH, Jahangir AA, Browner BD, Mehta S. The value of mentorship in orthopaedic surgery resident education: the residents' perspective. *Journal of Bone and Joint Surgery-American Volume.* 2009;91(4):1017-1022.

88. Rose M, Best D. *Transforming practice through clinical education, professional supervision, and mentoring.* Elsevier Health Sciences; 2005.

89. Zachary LJ. *The mentor's guide: Facilitating effective learning relationships.* John Wiley & Sons; 2000.

90. Rolfe-Flett A. *Mentoring in Australia : a practical guide.* Frenchs Forest, N.S.W: Pearson Education; 2002.

91. Sakushima K, Mishina H, Fukuhara S, et al. Mentoring the next generation of physician-scientists in Japan: a cross-sectional survey of mentees in six academic medical centers. *BMC Medical Education.* 2015;15:54.

92. Levy BD, Katz JT, Wolf MA, Sillman JS, Handin RI, Dzau VJ. An initiative in mentoring to promote residents' and faculty members' careers. *Academic Medicine.* 2004;79(9):845-850.

93. Guise JM, Nagel JD, Regensteiner JG. Best practices and pearls in interdisciplinary mentoring from Building Interdisciplinary Research Careers in Women's Health Directors. *Journal of Women's Health.* 2012;21(11):1114-1127.

94. Donovan A. Views of radiology program directors on the role of mentorship in the training of radiology residents. *American Journal of Roentgenology.* 2010;194(3):704-708.

95. Devi V, Abraham RR, Adiga A, Ramnarayan K, Kamath A. Fostering research skills in undergraduate medical students through mentored student projects: Example from an Indian medical school. *Kathmandu University Medical Journal.* 2010;8(31):294-298.

96. Larkin GL. Mapping, modeling, and mentoring: Charting a course for professionalism in graduate medical education. *Cambridge Quarterly of Healthcare Ethics.* 2003;12(2):167-177.

97. Frahm KA, Alsac-Seitz B, Mescia N, et al. Florida Public Health Training Center: Evidence-Based Online Mentor Program. *Journal of Continuing Higher Education.* 2013;61(3):175-182.

98. Sobbing J, Duong J, Dong F, Grainger D. Residents as Medical Student Mentors During an Obstetrics and Gynecology Clerkship. *Journal of Graduate Medical Education.* 2015;7(3):412-416.

99. Hartmann KE, Heitman E, Brown NJ. Chapter 35 - Education, Training and Career Choices: Training Basic, Clinical, and Translational Investigators. In: Robertson D, Williams GH, eds. *Clinical and Translational Science (Second Edition)*: Academic Press; 2017:637-647.

100. Bickel J. *Women in medicine: Getting in, growing, and advancing.* Vol 4: Sage; 2000.

101. Cohen C, Rooney G, Maw R, et al. Mentoring. *Clinical Medicine.* 2004;4(6):584-586.

102. Williams LL, Levine JB, Malhotra S, Holtzheimer P. The good-enough mentoring relationship. *Academic Psychiatry.* 2004;28(2):111-115.

103. Caine AD, Schwartzman J, Kunac A. Speed dating for mentors: a novel approach to mentor/mentee pairing in surgical residency. *Journal of Surgical Research.* 2017;214:57-61.

104. Tracy EE, Jagsi R, Starr R, Tarbell NJ. Outcomes of a pilot faculty mentoring program. *American journal of obstetrics and gynecology.* 2004;191(6):1846-1850.

105. Thomas-Maclean R, Hamoline R, Quinlan E, Ramsden VR, Kuzmicz J. Discussing mentorship: An ongoing study for the development of a mentorship program in Saskatchewan. *Canadian Family Physician.* 2010;56(7):e263-272.

106. Alisic S, Boet S, Sutherland S, Bould MD. A qualitative study exploring mentorship in anesthesiology: perspectives from both sides of the relationship. *Canadian Journal of Anaesthesia.* 2016;63(7):851-861.

107. Bhatia A, Singh N, Dhaliwal U. Mentoring for first year medical students: humanising medical education. *Indian journal of medical ethics.* 2013;10(2):100-103.

108. Lin CD, Lin BY, Lin CC, Lee CC. Redesigning a clinical mentoring program for improved outcomes in the clinical training of clerks. *Medical education online.* 2015;20:28327.

109. Patel VM, Warren O, Ahmed K, et al. How can we build mentorship in surgeons of the future? *ANZ Journal of Surgery.* 2011;81(6):418-424.

110. Straus SE, Chatur F, Taylor M. Issues in the mentor-mentee relationship in academic medicine: a qualitative study. *Academic Medicine.* 2009;84(1):135-139.

111. Harrison R, Anderson J, Laloe PA, Santillo M, Lawton R, Wright J. Mentorship for newly appointed consultants: what makes it work? *Postgraduate medical journal.* 2014;90(1066):439-445.

112. Ergun S, Busse JW, Wong A. Mentorship in anesthesia: a survey of perspectives among Canadian anesthesia residents. *Canadian Journal of Anaesthesia.* 2017;64(4):402-410.

113. Gurgel RK, Schiff BA, Flint JH, et al. Mentoring in otolaryngology training programs. *Otolaryngology - Head and Neck Surgery.* 2010;142(4):487-492.

114. Barker JC, Rendon J, Janis JE. Medical Student Mentorship in Plastic Surgery: The Mentee's Perspective. *Plastic and reconstructive surgery.* 2016;137(6):1934-1942.

115. Janis JE, Barker JC. Medical Student Mentorship in Plastic Surgery: The Mentor's Perspective. *Plastic and reconstructive surgery.* 2016;138(5):925e-935e.

116. Toklu HZ, Fuller JC. Mentor-mentee Relationship: A Win-Win Contract In Graduate Medical Education. *Cureus.* 2017;9(12).

117. Berman L, Rosenthal MS, Curry LA, Evans LV, Gusberg RJ. Attracting Surgical Clerks to Surgical Careers: Role Models, Mentoring, and Engagement in the Operating Room. *Journal of the American College of Surgeons.* 2008;207(6):793-800.e792.

118. Rogawski DS, Rogawski MM. Generational Differences in Mentoring Relationships-Reply. *Jama.* 2018;320(10):1038.

119. Waljee JF, Chopra V, Saint S. Mentoring Millennials. *Jama.* 2018;319(15):1547-1548.

120. Cochran A, Elder WB, Neumayer LA. Characteristics of Effective Mentorship for Academic Surgeons: A Grounded Theory Model. *Annals of surgery.* 2019;269(2):269-274.

121. Burlew CC. Surgical education: Lessons from parenthood. *The American Journal of Surgery.* 2017;214(6):983-992.

122. Birch DW, Asiri AH, de Gara CJ. The impact of a formal mentoring program for minimally invasive surgery on surgeon practice and patient outcomes. *The American Journal of Surgery.* 2007;193(5):589-592.

123. Fish D. The anatomy of educational evaluation in clinical education, mentoring and professional supervision. *Transforming Practice through Clinical Education, Professional Supervision and Mentoring*: ElsevierChurchill Livingstone Edinburgh; 2005:327-342.

124. Leary JC, Schainker EG, Leyenaar JK. The Unwritten Rules of Mentorship: Facilitators of and Barriers to Effective Mentorship in Pediatric Hospital Medicine. *Hospital Pediatrics.* 2016;6(4):219-225.

125. Zakrison TL, Polk TM, Dixon R, et al. Paying it forward: Four-year analysis of the Eastern Association for the Surgery of Trauma Mentoring Program. *Journal of Trauma and Acute Care Surgery.* 2017;83(1):165-169.

126. Nguyen SQ, Divino CM. Surgical residents as medical student mentors. *The American Journal of Surgery.* 2007;193(1):90-93.

127. Rogers J, Monteiro FM, Nora A. Toward measuring the domains of mentoring. *Family Medicine.* 2008;40(4):259-263.

128. Thomas PA, Kern DE, Hughes MT, Chen BY. *Curriculum development for medical education: a six-step approach.* JHU Press; 2016.

129. Rose GL, Rukstalis MR. Imparting Medical Ethics: The Role of Mentorship in Clinical Training. *Mentoring & Tutoring: Partnership in Learning.* 2008;16(1):77-89.