Another aspect of surgical residency training for future professional development through the application of mentorship program

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Abstract

Background

Traditionally, surgical residency training is more focused on obtaining surgical skills through a well-established coaching system worldwide. However, constant advances in medical science require surgeons to learn not only surgical skills but also the ability of scientific research to improve clinical practice and future professional development. The study aims to emphasize that professional education in terms of scientific research is also significant for surgical residency training.

Methods

All residents who entered the surgery residency program of the Department of Surgery in Linkou Chang Gung Memorial Hospital between years 2006 and 2015 were evaluated in the study. Generally, every resident is assigned to a mentor since the first year of residency. Then, the mentor would help the resident qualify a two-step evaluation in terms of scientific research during the residency training program.

Results

A total of 193 residents were evaluated in the study. All of them had completed the first step regarding oral presentation of their designated research, and the majority of residents obtained 80–90 points that were rated by referees. Overall, 102 residents (52.8%) had completed the second step with the publication of a research manuscript. The percentage of residents who had fulfilled the criteria of this two-step assessment ranged from 35.3–81.8% by year.

Conclusions

Surgical training has become more complex and challenging for residents nowadays. The continuing education for surgical residents should not be limited in coaching clinical practice. Scientific research is also essential for current surgical residency training, and a formal mentorship program may be beneficial for the future professional development of surgical residents.

Background

The core of medical education is teaching and mentorship based on learning from patients. A learning model established by Dr. William Halsted using repetitive opportunities for caring surgical patients under the mentorship of a skilled surgeon has been applied for surgical training since then. Based on the model, surgical residents would progressively gain an understanding of the scientific basis of surgical diseases and gradually achieve the acquisition of patient management and surgical skills (1). Although most surgeons have trained under this model, it has become increasingly noticeable that the current training

system is inadequate for continuous professional development (2, 3). The acquisition of patient management and surgical skills is undoubtedly crucial for patient care in terms of patient safety and quality improvement, but continuous professional development related to the ability of scientific research is also significant for the future academic career of surgeons.

Nowadays, both surgical skill and scientific research are essential for current training of surgical resident to promote professional development of future academic career. Therefore, the Department of Surgery initiated a program termed “R2 grand round” to enhance and train the ability of scientific research for surgical residents in our institute since 2006. The purpose of this study was to assess the impact of this training program on surgical residents and evaluate the ability of research performance throughout the residency training course.

Methods

Surgery residents

Linkou Chang Gung Memorial Hospital is the largest medical center and teaching hospital in Taiwan. All residents who entered the surgery residency program of the Department of Surgery in this institute between years 2006 and 2015 were enrolled in the study. The Department of Surgery includes seven subspecialty departments including General Surgery, Plastic Surgery, Proctologic Surgery, Cardiovascular and Thoracic Surgery, Urologic Surgery, Neurologic Surgery, and Pediatric Surgery. The surgical residency program contains five- and six-year training courses that consisted of 2 years of general training in the Department of Surgery and 3 to 4 years of subspecialty training in the subspecialty department.

Mentorship

In accordance with the rule for the surgical residency training of Taiwan Surgical Association, all residents should rotate to each subspecialty at the basis of monthly course. During the course of their training, residents are exposed to a wide variety of clinical knowledge and skills in each specialty surgery. In addition to the clinical training, each resident is assigned to an attending physician staff as mentor who is a senior researcher from the Department of Surgery since their first year of residency. The mentor serves as an instructor for teaching research design, literature review, data curation, presentation, as well as manuscript writing over the period of surgical residency. Generally, the mentor would propose a research topic in terms of either clinical or basic science for the resident. Then, the resident could start to collect informative data and literature review and further prepare an oral presentation related to their research content at the end of the second year of residency.

Evaluation of research performance

To assess the research performance of surgical residents, a two-step evaluation including oral presentation of research project and completion of manuscript writing was arranged at the second year of residency and the end of residency training, respectively. The oral presentation of research project was termed “R2 grand round,” which contained a 15-min structured presentation and 5-min question and

answer. Generally, the structured presentation consisted of introduction, methods, results, and discussion based on their research topic instructed by the assigned mentor. There were 5 to 7 senior researchers as referees selected from the Department of Surgery who assessed their performance according to a score sheet that was based on 60% of research project and 40% of presentation skill (Table 1).

Table 1
The score sheet for the oral presentation of “R2 grand round”.

Major components	Evaluation items
The content of research project. (60%)	Is the background content and conclusion of the research topic logical and consistent?
	Is data collection and analysis reasonable and clinically meaningful?
	Is the argument based on evidence base medicine?
The presentation skills and on-site performance. (40%)	The quality of slide preparation.
	Is the presentation clear?
	Appropriately respond to comments and questions?
Total scores (100%)	

The second step evaluation mainly assessed the ability of writing a research paper at the end of residency training. By the end of the training for the surgical residency program, residents must complete at least one research paper accepted for publication in the Science Citation Index (SCI) journal. Surgical residents who met both the aforementioned criteria were qualified to advance into an attending physician staff at the subspecialty of the Department of Surgery.

Statistical analysis

The primary end point of this analysis was to describe the surgical residency program in the medical center. The secondary end point aimed to evaluate the outcome of the research training for surgical residency. All analysis and illustration were conducted using Prism 5.0 (GraphPad Software, San Diego, CA, USA) for Windows.

Results

The number of surgical residents allowed for training in each teaching hospital every year was based on the accreditation of the Taiwan Surgical Association and Ministry of Health and Welfare of Taiwan. Among all medical teaching hospitals, the Department of Surgery in Linkou Chang Gung Memorial Hospital holds the largest capacity of surgical residents in Taiwan. A total of 195 residents were recruited in the surgery residency program of the Department of Surgery in this institute between years 2006 and 2015, in which 17 to 24 residents had been recruited for surgical training each year in the institute.

All residents had completed the oral presentation for “R2 grand round” related to their designated clinical research, and scores assessed by the referee are illustrated in Fig. 1. Based on the score sheet, the total score was gained by the sum of 60% related to the novelty and quality of research topic (Fig. 1a) and 40% regarding on-site performance of presentation (Fig. 1b). The majority of residents obtained between 80 and 90 points (Fig. 1c). Few residents had a score of less than 80 points, whereas several had more than 90 points.

Overall, 102 residents (52.8%) had completed the research manuscript accepted for publication in the SCI journal by the end of residency training. Figure 2 shows the number and percentage of residents who had successfully completed the research assignment. Year 2013 had the highest percentage of residents (81.8%, $n = 9$) who had research paper publication and fulfilled the criteria of promotion to become an attending physician staff at the subspecialty of the Department of Surgery whereas only 35.3% ($n = 6$) of residents met the criteria in year 2008.

Table 2 summarizes the comparison of residents according to the accomplishment of research publication. The majority of features related to residents and mentors were similar between the two groups. Residents were more likely to select mentor and research topic related to general surgery and plastic surgery. Nonetheless, pediatric surgery was the less popular subspecialty. Additionally, middle-generation surgeons who had clinical experience between 10 and 20 years were most likely to be a mentor. Meanwhile, the majority of mentors were assistant and associate professors in terms of academic positions.

Table 2
The comparison of residents according to the accomplishment of research assignment and publication of research manuscript.

	Yes *n* = 102(%)	No *n* = 91(%)	*p* value
Resident			
Sex			
Female: Male	21:81	13:78	0.264
Average score			0.240
< 80	1(1.0)	4(4.4)	
80–90	95(93.1)	84(92.3)	
≥ 90	6(5.9)	3(3.3)	
Mentor			
Subspecialty			0.408
General surgery	35(34.3)	36(39.5)	
Proctologic surgery	11(10.8)	5(5.5)	
Cardiovascular and Thoracic Surgery	12(11.8)	11(12.1)	
Urologic Surgery	8(7.8)	11(12.1)	
Neurologic Surgery	10(9.8)	10(11.0)	
Plastic Surgery	26(25.5)	17(18.7)	
Pediatric Surgery	0(0)	1(1.1)	
Years of practice			0.622
≤ 5	2(2.0)	2(2.2)	
5–10	22(21.6)	27(29.7)	
10–20	63(61.7)	51(56.0)	
> 20	15(14.7)	11(12.1)	
Academic position			0.573
No	2(2.0)	1(1.1)	
Lecturer	3(2.9)	6(6.6)	
Assistant professor	35(34.3)	37(40.6)	

	Yes *n* = 102(%)	No *n* = 91(%)	*p* value
Associate professor	38(37.3)	30(33.0)	
Professor	24(23.5)	17(18.7)	

Discussion

Along with the growing knowledge of medical science, medical education has become more complex and challenging nowadays. Specifically, surgical residency training has also become more difficult compared with previous training because of the advancement of surgical techniques and instrument (4, 5). Meanwhile, the implementation of working hour that decreased to 80 hours has also minimized residents' total clinical time as well as learning opportunity (6, 7). However, continuous professional development related to scientific research is also pivotal for the future academic career of surgeons. This study presents the training program in terms of medical research and assesses the effectiveness of the surgical residency training in an educational medical center.

Although training and accreditation system for surgical residency vary among different countries, the main goal of residency training as such is the same, that is, to gain the ability of providing quality patient care worldwide. However, today's medical education requires surgical residents who are capable of meeting increasingly complex challenges (8, 9). Meanwhile, professional development in terms of scientific research could be another significant issue of medical education apart from learning of clinical patient care. Usually, the majority of residents graduate from a medical school without any experience in scientific research. The most critical task is to initiate or participate in a scientific research during the training program of surgical residency. Therefore, the implementation of mentorship may be a promising strategy for guiding residents to gain research ability step-by-step (10–12).

Generally, mentorship implies that a designated mentor provides guidance in areas for gaining not just medical knowledge or surgical skills but also clinical research as well as continuous professional development over a period of surgical residency. Additionally, mentors may also share advice with residents on broader areas such as work–life balance, residency program selection, as well as long-term goals of career paths. However, the mentorship program is more specific on guiding residents related to scientific research in terms of selecting research topics, data curation, data analysis and presentation, and finally manuscript writing in our institute. Moreover, mentors could play a role to encourage the residents, ask them questions, and help them stay on the right track till the end goal. Actually, the majority of mentorship may be informal and unstructured nowadays, but the establishment of formal mentorship programs is increasingly getting attention worldwide (13–15).

Nonetheless, the success of mentorship program remains largely dependent on mentor–mentee relationships with commitments from both sides. A good mentor should be able to generate enthusiasm and inspire confidence and security in the mentee. In addition, mentees must also fulfill their role to define

their goals, responsibility, and willingness to learn as well as improvement in the mentorship relationship. However, finding the right mentor may also be pivotal to success in any field, and a successful mentorship is more likely to secure completion of research activity (16–18). Meanwhile, areas of interest in research topic and motivation in terms of obtaining a desire job and/or a fellowship promotion in a department are possibly significant concerns for residents' participation in clinical research (17). Therefore, the Department of Surgery usually provides a list of available research projects and mentors for residents at their first year of residency program to better support residents to perform research activity.

Similar to most other countries, the number of years for residency training in Taiwan is fixed (5 or 6 years). The training program of surgical residency is a continuous process including general surgery training for at least 2 years, followed by subspecialty training for another 3 to 4 years. The majority of residents would select research topic and mentor based on their intent of continuing development of subspecialty. As such, surgical residents who involve in scientific research as earlier as possible are more likely to make decision on their career path as well as whether to participate in clinical research in the future. Indeed, the initial motivation of involving research for most surgical residents is obtaining a desire fellowship promotion in a subspecialty department. However, the principle concept of this mentorship program is positive for future professional development of surgical residency not only in gaining research experience but also in building up confidence of clinical research.

Accordingly, the observational study may be limited by its retrospective nature from a single medical center. It is conceivable that the result in this study may not be representative of the whole resident population in the nation. However, the educational community has begun to be aware of the several challenges involved in residency training program due to changes in rapidly increasing knowledge and technology and limited education time because of increasing clinical, academic, and research demands. Additionally, larger and broader studies are needed to further elucidate the impact of the mentorship program in residency training in terms of future professional development and research performance in their future career paths.

Conclusion

Although surgical training has become more complex and challenging for residents nowadays, there is growing attention that current continuing medical education should not be limited in providing quality patient care. The ability of conducting scientific research is also necessary for current training of surgical resident for the sake of future professional development related to academic performance. Therefore, the implementation of this training program may possibly inspire the next generation of surgical residents as well as offer benefits related to their long-term career planning.

Abbreviations

SCI

Science Citation Index

Declarations

Ethics approval and consent to participate:

This study was an observation study and educational report, and no medical data was collected in this study. Ethics approval and consent to participate is not applicable for this study, and a local ethics committee ruled that no formal ethics approval was required in this particular case.

Consent for publication:

Not applicable

Competing interests:

The authors have no conflicts of interest.

Availability of data and materials:

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Authors' contributions:

Study concept, design and drafting the manuscript: Kun-Ming Chan

Acquisition of data and analysis: Kun-Ming Chan, Jun-Te Hsu, Chun-Nan Yeh, Ta-Sen Yeh, Wei-Chen Lee, Hsin-Yi Lien

Substantively revised the manuscript for important intellectual content: Hsin-Yi Lien

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Figures

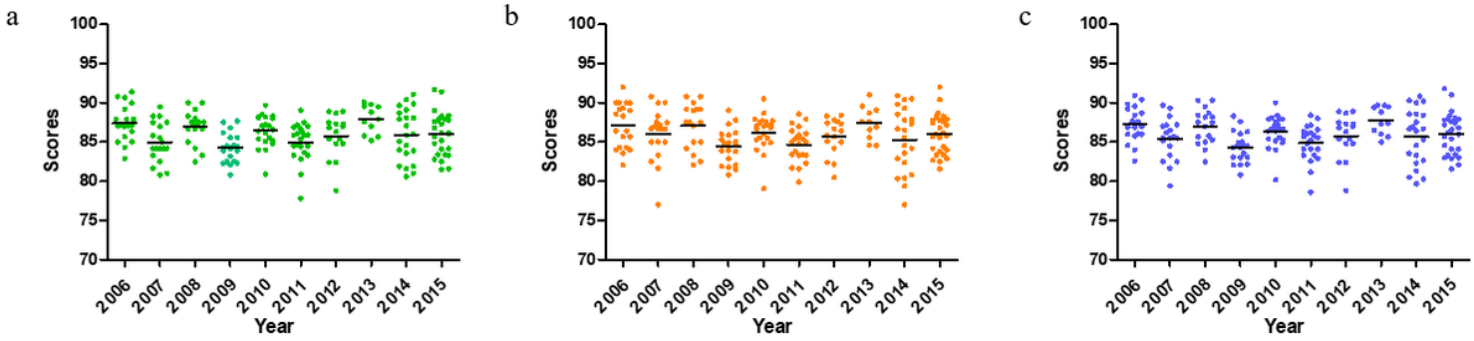

Figure 1

Scatterplot of R2 grand round for each resident. (a) The novelty and quality of research topic accounted for 60% of the total score. (b) The on-site performance of presentation accounted for 40% of the total score. (c). Total score. Black line represents the mean score.

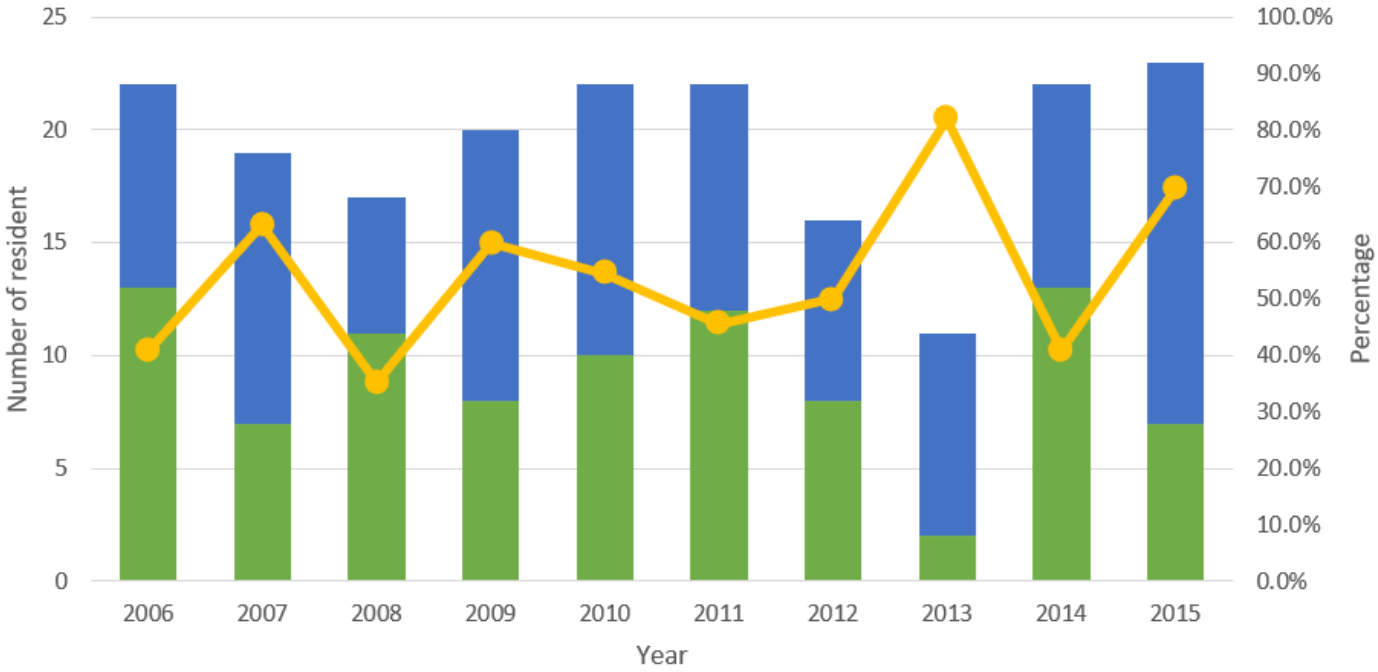

Figure 2

The number (blue bar) and percentage (yellow line) of residents who had successfully completed the research assignment and fulfilled this two-step evaluation. Green bar represents the residents who were unable to pass this evaluation.