

Colonoscopy education for surgical residents in Korea: a national survey of Korean Surgical Skill Study Group

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Purpose: A standardized colonoscopy training program surgical residents is still unestablished. The aim of this study was to assess the current status of colonoscopy training for surgical residents and collect the opinions on the direction for future colonoscopy education.

Methods: A questionnaire survey containing 24 items was conducted by sending an email to 310 colorectal surgeons in 84 training hospitals across the country.

Results: One hundred fifteen staff surgeons (115 of 310, 37%) of 84 institutions returned fully completed questionnaires. Most surgeons were working at tertiary hospitals with more than 5 years of clinical experience. About half of the responding surgeons answered that they perform colonoscopy in clinical practice and the main purpose of colonoscopy was follow-up after colorectal resection. Only 9 of 84 hospitals (10.7%) had a regular program on colonoscopy training for surgical residents. Most of colonoscopy education was conducted irregularly in a form of staff lecture, conferences or hands-on workshops. According to the future directions, 72 of 115 surgeons (62.6%) answered judging competency in colonoscopy should be needed for professional qualification of the surgeon. About 50 cases of colonoscopy seem appropriate during the 4-year-training of surgical residency, especially during the third- and fourth-year.

Conclusion: This survey shows colonoscopy education for surgical residents is still insufficient in Korea and that most surgeons feel that regular colonoscopy training is needed during the surgical residency period. There needs to be efforts to standardize the education program as well as various institutional and academic societal supports to achieve this goal.

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Key Words: Colonoscopy, Education, Colorectal surgery, Residency

INTRODUCTION

Endoscopy in Korea has become increasingly important in colorectal diseases especially after the establishment of the National Cancer Screening Program in 2004 [1]. In 2016,

there were 2,750,839 colonoscopy procedures held in Korea accounting for 134.9 billion KRW (Korean won) (111 million USD) in total fees [2]. Most of colorectal cancers in Korea are now being screened via colonoscopy which now is the third leading cause of malignancies in Korea where there were 26,978

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newly diagnosed cases in 2014 [3]. Colonoscopy proficiency is therefore becoming crucial especially for surgeons practicing in colorectal diseases.

Equally important is the education of new surgical residents in colonoscopy procedures. Currently, the Korean Surgical Society requires all residents to attend a 1-day training session program performing gastroscopy and colonoscopy on a simulator model during their residency [4]. Each endoscopic session lasts 120 minutes. However, this amount is far behind the sufficient level to achieve proficiency and thus much focus lies on each teaching hospital to incorporate some form of colonoscopy education for the residents. Currently, there is no standardized training program, regulations or guidelines regarding the proficiency of colonoscopy for surgical residents and most training is done according to each institution's ability.

The aim of this study was to assess the status of colonoscopy training for surgical residents in Korea and collect the opinions among experts on the direction for future colonoscopy education. We also investigated the status of surgeons themselves who are performing colonoscopies in their own institutions.

METHODS

A questionnaire was developed by the Korean Surgical Skill Study Group, a subgroup of the Korean Surgical Research Foundation dedicated to enhancing the skills and training of surgeons in Korea, containing 24 items (Table 1). The format was finalized during a management committee meeting held in November 11, 2014. This survey was conducted electronically by sending out e-mails to 310 colorectal surgeons in 84 training hospitals across the country between December 2014 and March 2015.

The questions were generally grouped into 4 categories: personal status (Q1–3), current practice pattern of performing colonoscopy (Q4–9), resident education for colonoscopy (Q10–19), and professional opinions regarding colonoscopy education (Q20–24). The full format was written in Korean. We asked each respondent their sex (male/female, Q1), years in practice (Q2), and affiliation in terms of health care delivery (Q3). We further asked the status of colonoscopy at their institution in terms of volume (Q4, Q6), proportion done by surgeons (Q5), indications in which surgeons perform colonoscopies (Q7, Q8: multiple choice), and obstacles faced (lack of support from other departments or hospital management) when surgeons are performing colonoscopies themselves (Q9). After asking the trainee status at each institution (Q10), we asked the participants whether they incorporated colonoscopy education programs (Q11), the format of which education is given (Q12), satisfactory level (Q13), and time and volume of which the residents will perform colonoscopies (Q14–18). We also asked

whether they faced any administrative or political obstacles when surgical residents were performing colonoscopies at each institution (Q19). We finally asked their professional opinion as to whether there should be a stricter goal in colonoscopy education for professional qualification of residency (Q20, 21), and the time and volume of a trainee to perform colonoscopy independently and safely (Q22–24). Frequencies of each answer were analyzed for each question with respect to each individual and/or institution.

RESULTS

One hundred fifteen staff surgeons (115 of 310, 37%) in 84 institutions returned fully completed questionnaires. 100 respondents (87.0%) were male. Most of the responding surgeons were working at tertiary hospitals (97 of 115, 84.3%) and had experience as a colorectal surgeon for more than 5 years (96, 83.5%)

Current practice pattern of colonoscopy

In terms of the current practice pattern, most respondents (82, 71.3%) answered that their institutions perform at least 500 colonoscopy cases per year. Of the total colonoscopy cases, 37 (32.1%) replied that surgeons had no role in those colonoscopies and 71 (61.7%) said less than 25%. Three respondents said they were performing more than 75% of all colonoscopies in their institution (Fig. 1). Individually, over half of the responders stated that they were performing less than 10 colonoscopies per month, with 26 (22.6%) at least performing at least one case a month and 51 (44.3%) performing none at all. Only 7 surgeons (6.1%) answered they were performing colonoscopy at least 50 cases per month.

The general purpose of the colonoscopies performed by surgeon was mainly to follow-up on their own surgical patients (65, 56.5%), followed by intraoperative colonoscopies and preoperative evaluation. Twenty-four surgeons (20.9%) were doing colonoscopies for general screening purposes. About a quarter answered they were performing only sigmoidoscopy instead of colonoscopy. We asked the surgeon's thoughts and obstacles faced when performing colonoscopies in their institution. Interestingly, there were more surgeons (66, 57.4%) experiencing obstacles in their practice when performing colonoscopies. The most common 2 obstacles were the conflict with internists, and time/space limitations for colonoscopy unit usage.

Resident education for colonoscopy

Only 9 out of the 84 institutions (10.7%) had an official training program during residency. Most of the colonoscopy education was done irregularly in forms of staff lecture, conferences or hands-on simulation workshops. Of the 9

Table 1. Questionnaire

Q1. What is your sex?	<input type="checkbox"/> Male	<input type="checkbox"/> Female
Q2. How long have you been in practice as a colorectal surgeon?	<input type="checkbox"/> Less than 5 years <input type="checkbox"/> 10 to 20 years <input type="checkbox"/> Over 30 years	<input type="checkbox"/> 5 to 10 years <input type="checkbox"/> 20 to 30 years
Q3. What type of hospital do you work for?	<input type="checkbox"/> Primary care clinic <input type="checkbox"/> Tertiary hospital <input type="checkbox"/> Specialized hospital for colorectal diseases <input type="checkbox"/> Other _____	<input type="checkbox"/> Secondary hospital <input type="checkbox"/> University hospital
Current practice pattern		
Q4. How many cases does your hospital perform a year?	<input type="checkbox"/> None <input type="checkbox"/> 50–100 cases/yr <input type="checkbox"/> 300–500 cases/yr	<input type="checkbox"/> Less than 50 cases/yr <input type="checkbox"/> 100–300 cases/yr <input type="checkbox"/> Over 500 cases/yr
Q5. Out of the total colonoscopies performed at your hospital, what is the proportion performed by surgeons?	<input type="checkbox"/> None <input type="checkbox"/> 25%–50% <input type="checkbox"/> 75%–100%	<input type="checkbox"/> Less than 25% <input type="checkbox"/> 50%–75%
Q6. How many colonoscopy cases do you perform per month?	<input type="checkbox"/> None <input type="checkbox"/> 10–30 cases/mo <input type="checkbox"/> 50–100 cases/mo	<input type="checkbox"/> Less than 10 per month <input type="checkbox"/> 30–50 cases/mo <input type="checkbox"/> Over 100 cases/mo
Q7. Describe the indications in which surgeons perform colonoscopies at your institution. (multiple choice)	<input type="checkbox"/> Health screening purposes <input type="checkbox"/> Preoperative evaluation <input type="checkbox"/> Postoperative surveillance <input type="checkbox"/> Intraoperative colonoscopy <input type="checkbox"/> Surgeons only perform sigmoidoscopies (proctoscopies)	
Q8. Of the given answers on Q7, what is your personal most common indication to perform colonoscopies?	<input type="checkbox"/> Health screening purposes <input type="checkbox"/> Preoperative evaluation <input type="checkbox"/> Postoperative surveillance <input type="checkbox"/> Intraoperative colonoscopy <input type="checkbox"/> Surgeons only perform sigmoidoscopies (proctoscopies)	
Q9. Were there any obstacles (i.e., lack of cooperation from other departments, lack of hospital support) when you were performing colonoscopies at your hospital?	<input type="checkbox"/> No, I had no problems. <input type="checkbox"/> Yes, I had problems. Tell us about the difficulties that you've encountered _____ _____ _____	
Q10. How many trainees (general surgery residents and clinical fellows) are there working at your hospital?	Total general surgery residents _____ Total clinical fellows _____ Colorectal fellows _____	
Resident education status		
Q11. Does your hospital incorporate any colonoscopy education programs for general surgery residents?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Q12. Describe the form of which colonoscopy education is held out in your hospital. (multiple choice)	<input type="checkbox"/> Nothing being done. <input type="checkbox"/> Indirect intermittent education from staff lectures, case reports, clinical meetings etc. <input type="checkbox"/> Theoretical education based on textbooks, scientific papers etc. <input type="checkbox"/> Nonregular education done at workshops using simulator models. <input type="checkbox"/> Observing colonoscopies done by surgeons. <input type="checkbox"/> Observing colonoscopies done by gastroenterologists or other staff. <input type="checkbox"/> Directly performing colonoscopies under supervision by surgeons. <input type="checkbox"/> Directly performing colonoscopies under supervision by gastroenterologists or other staff.	

Table 1. Continued

Q13. Do you think the answers to Q12 are sufficient enough for the education of colonoscopy to the residents at your institution?	<input type="checkbox"/> Absolutely not <input type="checkbox"/> No <input type="checkbox"/> Average <input type="checkbox"/> Mostly positive <input type="checkbox"/> Definitely yes
<i>Q14–19 Answer only if your institution has residents performing colonoscopies</i>	
Q14. Which year does the colonoscopy education take place?	<input type="checkbox"/> During 1st year surgical residency <input type="checkbox"/> During 2nd year surgical residency <input type="checkbox"/> During 3rd year surgical residency <input type="checkbox"/> During 4th year surgical residency
Q15. What is the cumulative period of colonoscopy education during residency?	<input type="checkbox"/> Less than 3 months <input type="checkbox"/> 3–6 months <input type="checkbox"/> 6–12 months <input type="checkbox"/> Over 12 months
Q16. What is the average total number of cases performed per resident during his/her residency?	<input type="checkbox"/> Less than 30 cases <input type="checkbox"/> 30–50 cases <input type="checkbox"/> 50–100 cases <input type="checkbox"/> 100–200 cases <input type="checkbox"/> Over 200 cases
Q17. What is the percentage of residents successfully reaching the cecum after residency training?	<input type="checkbox"/> No data <input type="checkbox"/> Less than 25% <input type="checkbox"/> 25%–50% <input type="checkbox"/> 50%–75% <input type="checkbox"/> Over 75%
Q18. What is the average total number of polypectomies performed per resident during his/her residency?	<input type="checkbox"/> No data <input type="checkbox"/> Less than 10 <input type="checkbox"/> 10–30 polypectomies <input type="checkbox"/> 30–50 polypectomies <input type="checkbox"/> 50–100 polypectomies <input type="checkbox"/> Over 100 polypectomies
Q19. Were there any obstacles (i.e., lack of cooperation from other departments, lack of hospital support) when surgical residents were performing colonoscopies at your hospital?	<input type="checkbox"/> No, I had no problems. <input type="checkbox"/> Yes, I had problems. Tell us about the difficulties that you've encountered _____ _____ _____
Professional opinions	
Q20. Do you think there should be a more materialized goal for professional qualification of surgical residency in terms of colonoscopy education (like the minimum number required of certain operations performed by a surgical resident for qualification)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Q21. (Answer only if you answered 'No' on the previous question.) Why did you answer 'no' for question 20?	<input type="checkbox"/> Colonoscopy education is not required in general surgery for now. <input type="checkbox"/> Training is more effective during clinical fellowship program <input type="checkbox"/> I agree on the necessity but there are many logistic challenges (lack of staff, facilities) <input type="checkbox"/> Other _____ _____ _____
Q22. What do you think is the minimal required cases to perform colonoscopies independently and safely?	<input type="checkbox"/> Less than 50 cases <input type="checkbox"/> 50–100 cases <input type="checkbox"/> 100–150 cases <input type="checkbox"/> 150–200 cases <input type="checkbox"/> Over 200 cases
Q23. What do you think is the adequate number of cases needed for sufficient colonoscopy education for residents?	<input type="checkbox"/> Less than 50 cases <input type="checkbox"/> 50–100 cases <input type="checkbox"/> 100–150 cases <input type="checkbox"/> 150–200 cases <input type="checkbox"/> Over 200 cases
Q24. When do you think is the optimal time to initiate colonoscopy education to surgical residents?	<input type="checkbox"/> During 1st year surgical residency <input type="checkbox"/> During 2nd year surgical residency <input type="checkbox"/> During 3rd year surgical residency <input type="checkbox"/> During 4th year surgical residency

institutions claimed to have an official program, there was a discrepancy among surgeons' responses regarding the education period and the volume of colonoscopies performed by residents. Counting the maximum response of the period/cases coming from each institution, 6 stated their training period was less than 3 months, 2 between 3–6 months, and one over 12

months. All but one stated the volume was less than 30 cases during the residency period, and the remainder stated between 100–200 cases. Unsurprisingly, we could find most residents in Korea do not have experience in polypectomies at present and most of the surgeons in teaching hospitals (78.2%, 90 of 115) were not satisfied with their status of resident education.

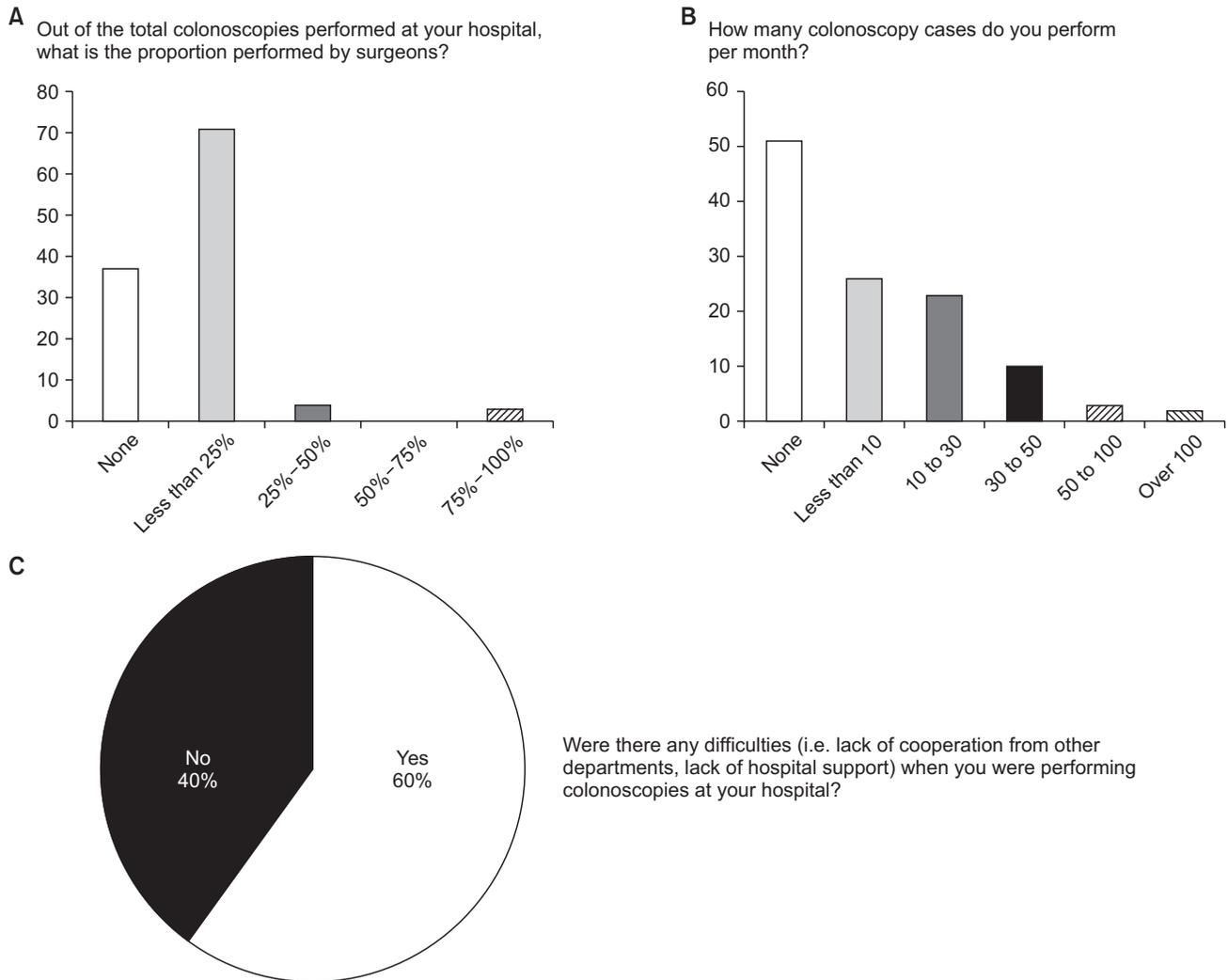


Fig. 1. Survey results regarding current practice pattern. (A) Proportion of colonoscopies performed by surgeons (Q5). (B) Cases performed by each surgeon (Q6). (C) Obstacles faced when performing colonoscopy in each institution (Q9).

Professional opinions regarding colonoscopy education

Asking for professional opinions (Fig. 2), 62.6% (72 of 115) viewed there needed to be a more materialized goal judging competency for professional qualification of surgical residency. Of the 43 who viewed otherwise, 17 thought colonoscopy training should be done during fellowship training and 23 generally agreed on the necessity of colonoscopy but was doubtful towards the logistics such as lack of staff or space. None thought colonoscopy training was unnecessary.

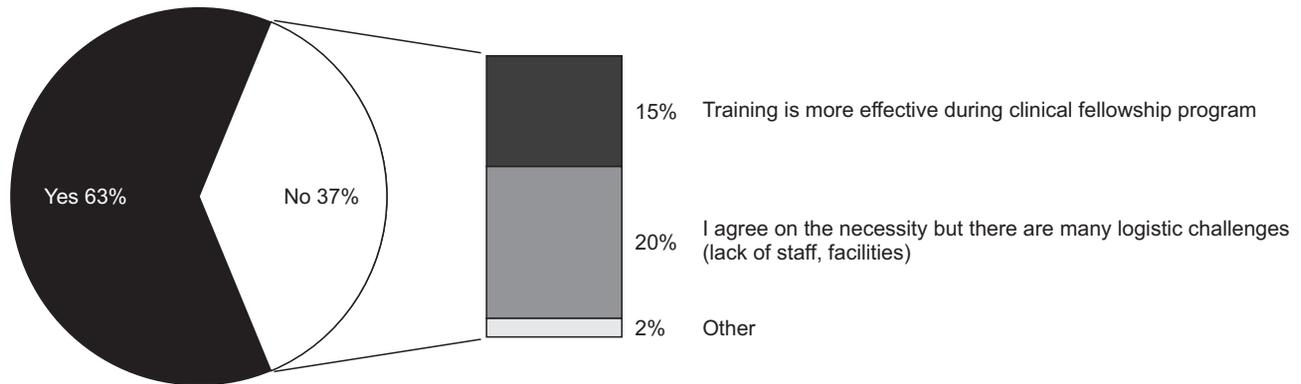
In terms of proficiency, 91.3% (105 of 115) viewed at least 50 cases were needed to achieve complete independence in colonoscopy in general and 68% thought at least 50 cases were needed to adequately train residents when an official training program was established. The majority thought the starting point of colonoscopy training be in the third or final year of residency with 56 (48.7%) and 24 respondents (20.9%),

respectively.

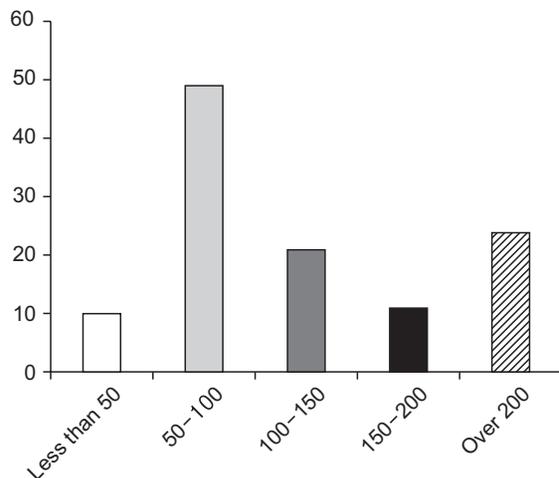
DISCUSSION

Historically, colonoscopy was introduced to Korea in the 1970's and was initially performed by surgeons and internists alike [5,6]. However, while gastroenterologists further developed colonoscopy as one of their cornerstones of medical training, surgeons generally overlooked colonoscopy with many eventually abandoning the procedure, thus resulting in a gap in colonoscopy training. In recent years, colonoscopy proficiency has become a key element in a surgeons' practice due to the increased prevalence of benign and malignant colorectal diseases including colorectal cancer, inflammatory bowel diseases, ischemic colitis and anorectal diseases. This is clearly evident in primary care units where 47% (1,187,007 of 2,750,839 in 2016) of the total colonoscopies are being performed in

A Do you think there should be a more materialized colonoscopy goal for professional qualification of surgical residency?



B What do you think is the minimal required cases to perform colonoscopies independently and safely?



C What do you think is the adequate number of cases needed for sufficient colonoscopy education for residents?

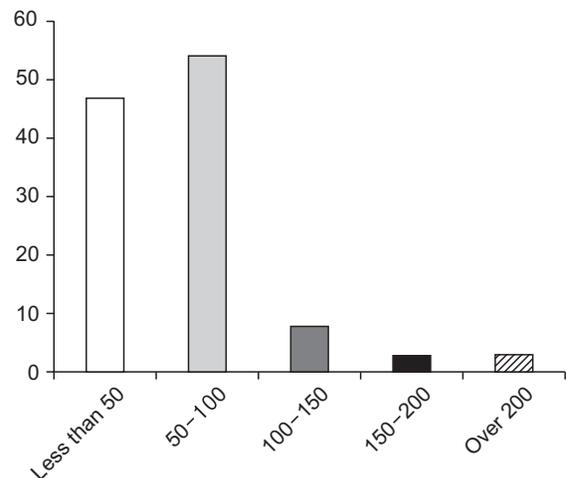


Fig. 2. Survey results on surgeons professional opinions. (A) Whether there should be a more materialized goal for professional qualification (Q20, Q21). (B) Minimum cases required to perform colonoscopy independently and safely (Q22). (C) Sufficient number of colonoscopies for surgical training (Q23).

the nation and at least an estimated 30% are being done by surgeons [2,6]. Considering this, it would be equally important to equip and educate surgical residents to prepare them with the necessary skills to use after their training.

The importance for colonoscopy education was early recognized in the United States and incorporated to their surgical training program. The American Board of Surgery has required endoscopic training since 1980 [7]. The Society of American Gastrointestinal Endoscopic Surgeons [8] recently changed their recommendation from the number of procedures to a generalized qualification to be assessed by qualified instructors. Similarly, the Accreditation Council for Graduate Medical Education and the American Board of Medical Specialties have made a toolbox to determine competence [9]. There have been countless measures over the years judging the competency and proficiency of colonoscopy for surgeons and

surgical residents alike and polices have changed accordingly [10-14].

Based on our results there is a consensus on the importance of colonoscopy education during residency but most (78.2%) were unsatisfied with the current situation where colonoscopy training for surgical residents is not done at all or done with nonstandardized methods. The main reason for this is surgeons at teaching hospitals are not performing sufficient numbers of colonoscopies. In our survey cohort, 67.0% were performing less than 10 cases a month where two-thirds were doing none. A 2012 survey done on 22 secondary and tertiary hospitals where surgeons performed colonoscopies, of the 118,416 cases done, only 7,976 (6.7%) were done in tertiary centers and in fact, the largest three hospitals did 87.3% (6,960 of 7,976 cases) of the cases [6]. This concentration was also noted in secondary hospitals where 86.0% (95,000 of 110,000) were done in the 6

largest hospitals all of which were specialist hospitals dedicated to colorectal diseases. Lack of colonoscopy cases naturally leads to under-education. This is consistent with the results in our survey cohort where the institutions said to have an official training program were also performing more colonoscopies from the institutions that were not. The top 3 surgeons performing the largest cases per month were also from these institutions.

There were two main reasons for the lack of colonoscopy procedures performed by surgeons in teaching hospitals. First and foremost is the lack of time to incorporate colonoscopy sessions into their busy schedules. Surgeons in teaching hospitals already have a busy 54.7 average hour a week schedules rotating between clinical duties, education, and research [15]. The challenging work environment of surgeons generally have prevented putting education, especially of new procedures not familiar to their practice out of sight. Second is the conflict between other departments already performing endoscopy sessions as a mainstay. In our results, many of the procedures done by surgeons were on their own surgical patients, mostly for follow-up or evaluation before surgery. Colonoscopy for general screening purposes was generally reserved for the gastroenterologists, and as shown in the survey, there is much resistance for surgeons. This resistance can also be witnessed in the most prestigious academic journals as well [16].

However, despite these shortcomings, progress is needed. To apply for specialist qualification exams, the Korean Surgical Society states a minimum requisite of surgical procedures either performed and/or assisted by a resident. This is to assure a certain standard among different training institutions. In our study, when asked if there needed to be a similar goal stated in terms of colonoscopy procedures, most viewed positive toward a more objective approach. Many viewed at least 50 cases to be the adequate minimum during residency for their education. This is debatable along with the result of 91.3% saying at least 50 cases are needed to perform colonoscopy independently and safely. Previous literatures regarding the learning curve of colonoscopy and required cases to achieve proficiency have

generally been higher [17,18] with many not only focusing on the absolute threshold but rather the objective quality of the colonoscopy itself for credential guidelines [19,20]. Thus, it must be noted, that these numbers are not based on solid evidence but a collective of respondents' opinions; many who lack the experience of performing colonoscopy themselves and/or training of colonoscopy to residents. Nonetheless, if a certain objective goal is identified, it is much easier to have more discussions regarding measures for actual 'proficiency.' Another thing to consider is, to achieve this goal, much support is needed not only from the surgical society but also from individual institutions as well, where setting a higher goal would likely be more difficult to accomplish. Twenty percent (20%) were worried for the difficult logistics that will occur when such objective goals are suddenly implemented into the residency program. The discrepancy among institutions must also be considered when enforcing a firm policy.

Our study has many limitations. Response rate was 37% and the survey for actual procedures being done was highly based on the surgeon's ability to recall and not on solid numbers. This bias may have potentially affected the results. However, the overall message where surgical residents are generally being undertrained for colonoscopy and the necessity for improvement is unchanged. Although the survey was conducted in 2014, the requirement for specialist qualification in terms of colonoscopy has been unaltered and still to this day, there is no composite goal for endoscopic proficiency.

In conclusion, this survey shows colonoscopy education for surgical residents is still insufficient in Korea and that most surgeons feel that regular colonoscopy training is needed during the surgical residency period. There needs to be efforts to standardize the education program as well as various institutional and academic societal supports to achieve this goal.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Choi KS, Jun JK, Lee HY, Hahm MI, Oh JH, Park EC. Increasing uptake of colorectal cancer screening in Korea: a population-based study. *BMC Public Health* 2010;10:265.
2. Health Insurance Review & Assessment Service. Statistics of Practices (diagnosis/operations etc.) of National Interest [Internet]. Wonju (Korea): Health Insurance Review & Assessment Service; [cited 2017 Aug 1]. Available from: <http://openda-ta.hira.or.kr/op/opc/olapMfrnIntrsDiagBhvInfo.do>.
3. Jung KW, Won YJ, Oh CM, Kong HJ, Lee DH, Lee KH, et al. Cancer statistics in Korea: incidence, mortality, survival, and prevalence in 2014. *Cancer Res Treat* 2017; 49:292-305.

4. Korean Surgical Society. Surgical Skill Education Information [Internet]. Seoul (Korea): Korean Surgical Society; [cited 2017 Jul 26]. Available from: <http://www.surgeryedu.or.kr/congress1/index.html?gubun=8&sgubun=9>.
5. Park DJ. Endoscopy education programs for surgical residents. 2012 Annual Meeting of the Korean Surgical Society [Internet]. Seoul (Korea): Korean Surgical Society; [cited 2017 Jul 26]. Available from: https://www.surgery.or.kr/data/2012_spring_kss_newspirits.pdf.
6. Jeong SK. Endoscopy education programs for surgical fellows and surgeons. 2012 Annual Meeting of the Korean Surgical Society [Internet]. Seoul (Korea): Korean Surgical Society; [cited 2017 Jul 26]. Available from: https://www.surgery.or.kr/data/2012_spring_kss_newspirits.pdf.
7. Max MH, Polk HC Jr. Perceived needs for gastrointestinal endoscopic training in surgical residencies. *Am J Surg* 1982;143:150-4.
8. Wexner SD, Garbus JE, Singh JJ; SAGES Colonoscopy Study Outcomes Group. A prospective analysis of 13,580 colonoscopies. Reevaluation of credentialing guidelines. *Surg Endosc* 2001;15:251-61.
9. Vo DM, Gauvin JM, Chen SL. Endoscopy education in general surgery residencies: meeting the new RRC requirements. *J Surg Res* 2010;163:210-3.
10. Asfaha S, Alqahtani S, Hilsden RJ, MacLean AR, Beck PL. Assessment of endoscopic training of general surgery residents in a North American health region. *Gastrointest Endosc* 2008;68:1056-62.
11. Pace D, Borgaonkar M, Evans B, Marcoux C, Lougheed M, Falk V, et al. Annual colonoscopy volume and maintenance of competency for surgeons. *Surg Endosc* 2017;31:2630-5.
12. Fonseca AL, Reddy V, Yoo PS, Gusberg RJ, Longo WE. Senior surgical resident confidence in performing flexible endoscopy: what can we do differently? *J Surg Educ* 2016;73:311-6.
13. Sutton E, Chase SC, Klein R, Zhu Y, Godinez C, Youssef Y, et al. Development of simulator guidelines for resident assessment in flexible endoscopy. *Am Surg* 2013;79:14-22.
14. Hope WW, Hooks WB 3rd, Kilbourne SN, Adams A, Kotwall CA, Clancy TV. Assessing resident performance and training of colonoscopy in a general surgery training program. *Surg Endosc* 2013;27:1706-10.
15. Park YH, Lim SM, Seo KH, Lee BI, Park CH. A study on the faculties' satisfaction of Korean medical schools for their educational, medical and research environment improvement. *Res Inst Healthc Policy Rep* 2012;6:1-165.
16. Baxter NN, Warren JL, Barrett MJ, Stukel TA, Doria-Rose VP. Association between colonoscopy and colorectal cancer mortality in a US cohort according to site of cancer and colonoscopist specialty. *J Clin Oncol* 2012;30:2664-9.
17. Marshall JB. Technical proficiency of trainees performing colonoscopy: a learning curve. *Gastrointest Endosc* 1995;42:287-91.
18. Lee SH, Chung IK, Kim SJ, Kim JO, Ko BM, Hwangbo Y, et al. An adequate level of training for technical competence in screening and diagnostic colonoscopy: a prospective multicenter evaluation of the learning curve. *Gastrointest Endosc* 2008;67:683-9.
19. Faigel DO, Cotton PB; World Organization of Digestive Endoscopy. The London OMED position statement for credentialing and quality assurance in digestive endoscopy. *Endoscopy* 2009;41:1069-74.
20. ASGE Standards of Practice Committee, Faulx AL, Lightdale JR, Acosta RD, Agrawal D, Bruining DH, et al. Guidelines for privileging, credentialing, and proctoring to perform GI endoscopy. *Gastrointest Endosc* 2017;85:273-81.