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

Duck-Woo Kim1*, Min Hyun Kim1*, Hyun Ae Kim2, Kil Yeon Lee3, Seung-Yong Jeong4, Woo Yong Lee5; for the Korean Surgical Skill Study Group

1Department of Surgery, Seoul National University Bundang Hospital, Seongnam, Korea
2MediOffice, Seoul, Korea
3Department of Surgery, School of Medicine, Kyung Hee University, Seoul, Korea
4Department of Surgery, Seoul National University Hospital, Seoul, Korea
5Department of Surgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

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

*Duck-Woo Kim and Min Hyun Kim contributed equally to this study as co-first authors.

• The abstract of this article was presented at the 48th Annual Meeting of the Korean Society of Coloproctology in Busan, Korea, on April 10–12, 2014.

Copyright © 2018, the Korean Surgical Society

Ap Annals of Surgical Treatment and Research is an Open Access Journal. All articles are distributed under the terms of the Creative Commons Attribution Non-Commercial License (http://creativecommons.org/licenses/by-nc/4.0/) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.
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 access 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. One hundred 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

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

Table 1. Continued

| Question | Options |
|----------|---------|
| Q13. Do you think the answers to Q12 are sufficient enough for the education of colonoscopy to the residents at your institution? | □ Absolutely not □ No □ Average □ Mostly positive □ Definitely yes |

Q14–19 Answer only if your institution has residents performing colonoscopies

| Question | Options |
|----------|---------|
| Q14. Which year does the colonoscopy education take place? | □ During 1st year surgical residency □ During 2nd year surgical residency □ During 3rd year surgical residency □ During 4th year surgical residency |
| Q15. What is the cumulative period of colonoscopy education during residency? | □ Less than 3 months □ 3–6 months □ 6–12 months □ Over 12 months |
| Q16. What is the average total number of cases performed per resident during his/her residency? | □ Less than 30 cases □ 30–50 cases □ 50–100 cases □ 100–200 cases □ Over 200 cases |
| Q17. What is the percentage of residents successfully reaching the cecum after residency training? | □ No data □ 25%–50% □ Less than 25% □ 50%–75% □ Over 75% |
| Q18. What is the average total number of polypectomies performed per resident during his/her residency? | □ No data □ 10–30 polypectomies □ Less than 10 □ 30–50 polypectomies □ 50–100 polypectomies □ 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? | □ Yes □ No \[...\] |

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)? | □ Yes □ No \[...\] |

Q21. (Answer only if you answered ‘No’ on the previous question.) Why did you answer ‘no’ for question 20? | □ Colonoscopy education is not required in general surgery for now. □ Training is more effective during clinical fellowship program □ I agree on the necessity but there are many logistic challenges (lack of staff, facilities) □ Other \[...\] |

Q22. What do you think is the minimal required cases to perform colonoscopies independently and safely? | □ Less than 50 cases □ 50–100 cases □ 100–150 cases □ 150–200 cases □ Over 200 cases |

Q23. What do you think is the adequate number of cases needed for sufficient colonoscopy education for residents? | □ Less than 50 cases □ 50–100 cases □ 100–150 cases □ 150–200 cases □ Over 200 cases |

Q24. When do you think is the optimal time to initiate colonoscopy education to surgical residents? | □ During 1st year surgical residency □ During 2nd year surgical residency □ During 3rd year surgical residency □ During 4th year surgical residency |
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...
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

![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).](image-url)
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 preventing 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://opendata.hira.or.kr/op/opc/olapMfrnIntrsDiag
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&gubun=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, Borgeonkar M, Evans B, Marcoux C, Lougheed M, Falk V, et al. Annual colonoscopy volume and maintenance of competency for surgeons. Surg Endosc 2017;31:2650-5.
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.