



The SAGES flexible endoscopy course for fellows: a worthwhile investment in furthering surgical endoscopy

Walter Kucera¹ · Matthew Nealeigh¹ · Brian Dunkin² · E. Matthew Ritter¹ · Aimee Gardner³

Received: 27 June 2018 / Accepted: 20 August 2018 / Published online: 27 August 2018

© This is a U.S. government work and its text is not subject to copyright protection in the United States; however, its text may be subject to foreign copyright protection 2018

Abstract

Background The SAGES flexible endoscopy course for minimally invasive surgery (MIS) fellows improves confidence and skills in performing gastrointestinal (GI) endoscopy. This study evaluated the long-term retention of these confidence levels and investigated how fellows changed practices within their fellowships due to the course.

Methods Participating MIS fellows completed surveys 6 months after the course. Respondents rated their confidence to independently perform 16 endoscopic procedures (1 = not at all; 5 = very), barriers to use of endoscopy, and current uses of endoscopy. Respondents also noted participation in additional skills courses and status of fundamentals of endoscopic surgery (FES) certification. Comparisons of responses from the immediate post-course survey to the 6-month follow-up survey were examined. McNemar and paired *t* tests were used for analyses.

Results 23 of 57 (40%) course participants returned to the 6-month survey. No major barriers to endoscopy use were identified. Fellows reported less competition with GI providers as a barrier to practice compared to their original post-course expectations (50% vs. 86%, $p < 0.01$). In addition, confidence was maintained in performing the majority of the 16 endoscopic procedures, although fellows reported significant decreases in confidence in independently performing snare polypectomy (−26%; $p < 0.05$), control of variceal bleeding (−39%; $p < 0.05$), colonic stenting (−48%; $p < 0.01$), BARRX (−40%; $p < 0.05$), and TIF (−31%; $p < 0.05$). Fewer fellows used the GI suite to manage surgical problems than was anticipated post course (26% vs. 74%, $p < 0.01$). Fellows who passed FES noted no significant loss of independence, changes in use, or barriers to use. 18% made additional partnerships with industry after the course. 41% stated flexible endoscopy has influenced their post-fellowship job choice.

Conclusions The SAGES flexible endoscopy course for MIS fellows results in long-term practice changes with participating fellows maintaining confidence to perform the majority of taught endoscopic procedures 6 months later. Additionally, fellows experienced no major barriers to implementing endoscopy into practice.

Keywords Flexible endoscopy · Fellows · Course · Minimally invasive · Follow-up

Disclaimer The opinions or assertions contained herein are the private ones of the authors and are not to be construed as official or reflecting the views of the Department of Defense, the Uniformed Services University of the Health Sciences, or any other agency of the U.S. Government.

✉ Walter Kucera
Walter.kucera@usuhs.edu

¹ Department of Surgery, Uniformed Services University of the Health Sciences/Walter Reed National Military Medical Center, 8901 Wisconsin Ave., Bethesda, MD 20889, USA

² Department of Surgery, Houston Methodist Hospital, Houston, TX, USA

³ Department of Surgery, Baylor College of Medicine, Houston, TX, USA

The utilization of flexible gastrointestinal (GI) endoscopy in GI surgery has become increasingly important. This is particularly true in the field of minimally invasive surgery (MIS). Of note, in many rural surgery practices, endoscopy makes up over 50% of the total case volume [1, 2]. As a result, the American Board of Surgery (ABS) recently implemented the Flexible Endoscopy Curriculum (FEC), which defines five levels of cognitive and psychomotor competencies and includes milestones of achievement including passing the fundamentals of endoscopic surgery (FES) written and skills examinations [3–5]. Beginning with the graduating general surgery resident class of 2018, completion of the entire FEC, including FES, will be required for board certification [5].

In addition to changes to residency training, efforts are underway to better prepare MIS and bariatric surgery fellows to perform endoscopy. One of these efforts is the annual Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) Therapeutic Flexible Endoscopy Course for Fellows (aka SAGES flexible endoscopy course). This 2-day program consists of six 15-min lectures, four 45-min panel discussions, and almost 8 h of hands-on skills stations spread over 2 days. Previous work evaluated the immediate effects of the program but not the long-term impact of the course on participant attitudes, confidence, and practice behaviors [6].

The goal of this study was to examine the extent to which increases in confidence and skill in performing endoscopy, as a result of attending the SAGES flexible endoscopy course, are maintained over time. These data may help inform curricular reform and also serve as a needs assessment for future course development.

Methods

MIS fellows who attended the 2016 SAGES flexible endoscopy course were invited to participate in this study. This study was granted an educational exemption by the Case Western Reserve University Institutional Review Board. Prior to the 2016 SAGES flexible endoscopy course, participants completed a questionnaire consisting of demographic data, previous flexible endoscopy experience, career goals, plans for future uses of endoscopy, and level of confidence in independently performing 16 endoscopic procedures (Appendix 1), as measured by a 5-point Likert scale (1 = not at all, 2 = minimally, 3 = somewhat, 4 = moderately, 5 = very). Immediately following the program, participants gave feedback on the course as a whole, their new level of confidence in performing the 16 endoscopic procedures, and plans for incorporating flexible endoscopy into practice. These data have been published elsewhere and serve as baseline rates for the current study [6].

Six months after the 2016 course, participating fellows were invited to complete a web-based survey. The survey consisted of questions about their current use of endoscopy in practice, ways in which the course influenced their practice patterns, and Likert score questions regarding confidence about procedures covered in the course and barriers to utilizing endoscopy in their practice (1 = not at all, 5 = very).

Six-month post-course survey responses were compared against the immediate post-course responses. Learners previously had generated a unique participant-generated identification code, which allowed for de-identified, matched comparison of questionnaires for the two time periods. In addition to using Likert confidence scores, in accordance with the a priori designations from the previous study, participants were judged to be confident enough for independent

practice if they rated a procedure greater than “somewhat confident” (Likert score ≥ 3 on the 5-point scale) [6]. Similarly, perceived barriers to practicing endoscopy were judged to be high enough to be a true impediment if participants rated the barrier “somewhat of a barrier” or higher (Likert score ≥ 3 on the 5-point scale).

Likert scores used to measure confidence in procedures and barriers to practice were compared using paired *t* tests. Confidence for procedural independence and actual barrier levels (Likert score ≥ 3), as well as actual uses of endoscopy and changes to practice patterns were compared using McNemar tests. All descriptive statistics and comparisons were completed using SPSS version 24 (IBM; Chicago, IL).

Results

Twenty-three of the fifty-eight (40%) original participants responded to the 6-month follow-up survey. The mean age of the respondents was 33 ± 3 years (range 28–42 years). Nineteen (83%) were male. Six (26%) of the follow-up respondents had passed FES, and four (17%) had attended an additional flexible endoscopy course by the time of the follow-up survey. The follow-up respondents included three MIS-only fellows (13%), three bariatrics-only fellows (13%), three flexible endoscopy or advanced GI fellows (13%), eleven combined MIS/bariatric fellows (48%), and three combined MIS/bariatric/flexible endoscopy fellows (13%).

Participants noted no increase in barriers to their actual practice 6 months later as compared to their expectations immediately after the course (Fig. 1). In fact, there was a significant decrease in the level to which competition from gastroenterology (GI) colleagues served as a barrier to endoscopy (3.64 ± 1.14 vs. 2.73 ± 1.28 ; $p < 0.01$) as compared to the immediate post-course survey. This change in Likert score translated to a significant decrease in the percentage of participants reporting competition with GI being a significant barrier to practice (50% vs. 86%, $p < 0.01$). No other potential barriers demonstrated significant differences from the immediate post-course survey to the follow-up survey.

Participants reported a significant decrease in actual use of endoscopy in the GI suite to manage surgical problems in the 6-month follow-up survey compared to what they predicted in the immediate post-course survey (74% vs. 26%; $p < 0.01$). No other uses had statistically discernible differences between the follow-up and the immediate post-course surveys (Fig. 2).

Among procedural confidence measured by Likert scores, all procedures except for diagnostic upper endoscopy exhibited a decline in fellow confidence between the post-course and follow-up surveys (Fig. 3A). Diagnostic upper endoscopy saw a significant increase in confidence scores on the follow-up survey (4.52 ± 0.67 vs. 4.87 ± 0.34 ; $p < 0.01$)

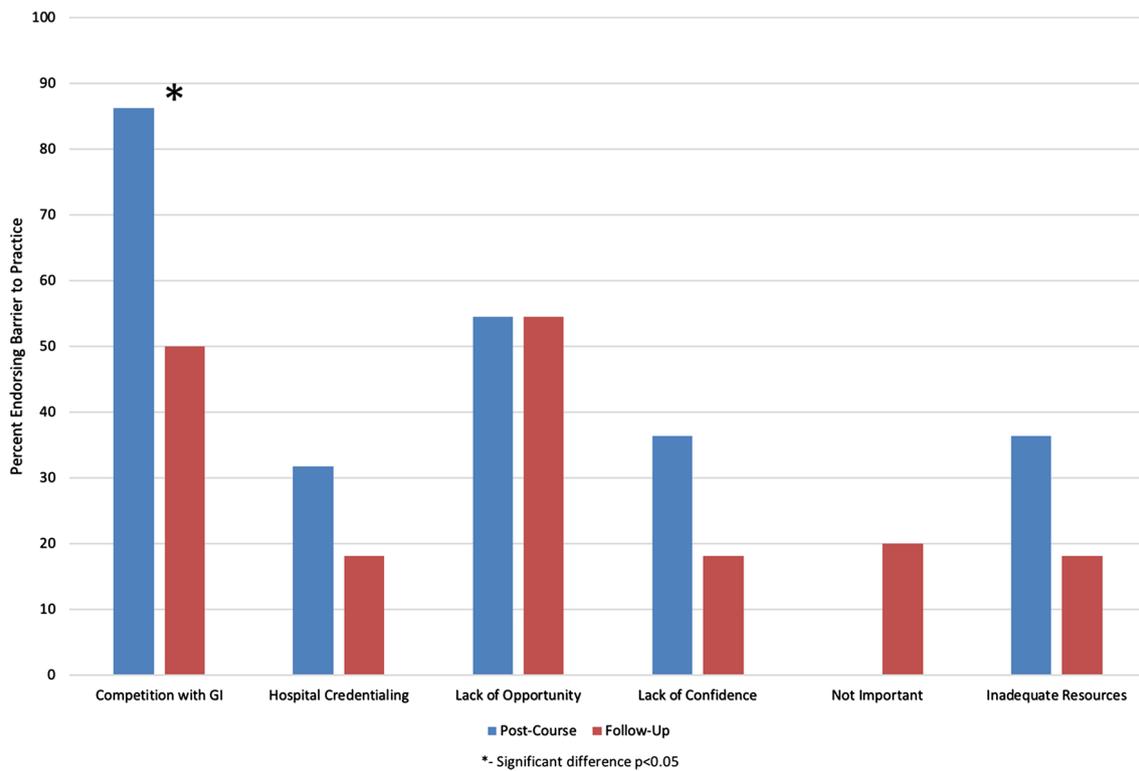


Fig. 1 Barriers to use of endoscopy

compared to the post-course survey. Of the procedures with a decline in confidence, only percutaneous endoscopic gastrostomy (PEG) (4.74 ± 0.54 vs. 4.43 ± 0.84 ; $p = 0.02$), upper endoscopy to control non-variceal bleeding (3.26 ± 0.81 vs. 2.65 ± 0.78 ; $p < 0.01$), upper endoscopy to control variceal bleeding (2.78 ± 1.00 vs. 1.96 ± 0.88 ; $p < 0.01$), colonic stenting (3.22 ± 0.85 vs. 2.17 ± 0.98 ; $p < 0.01$), endoscopic mucosal resection (EMR) (2.70 ± 1.19 vs. 1.78 ± 0.95 ; $p < 0.01$), endoscopic radiofrequency (RF) esophageal mucosa ablation (Barrx™) (3.26 ± 0.96 vs. 2.00 ± 1.13 ; $p < 0.01$), use of Apollo OverStitch™ device (3.26 ± 0.92 vs. 2.70 ± 1.30 ; $p = 0.05$), transoral incisionless fundoplication (TIF) (2.91 ± 1.04 vs. 1.83 ± 0.89 ; $p < 0.01$), and foreign body removal (4.17 ± 0.72 vs. 3.65 ± 1.03 ; $p = 0.04$) had statistically discernible differences.

Fellows reported similar levels of confidence for independently performing the majority of procedures (11/16) 6 months after the course. (Fig. 3B). Only colonoscopy with snare polypectomy (91% vs. 65%; $p = 0.03$), upper endoscopy with management of variceal bleeding (65% vs. 26%; $p = 0.02$), colonic stenting (78% vs. 30%; $p < 0.01$), RF esophageal mucosal ablation (70% vs. 30%; $p = 0.01$), and TIF (61% vs. 30%; $p = 0.04$) demonstrated statistically discernible declines in confidence to independently perform the procedure. While almost all the other procedures trended towards decrease, balloon dilation of a stricture trended

towards an increase in confidence to perform independently. Of note, the subgroup of respondents who had passed FES had no statistically discernible loss of confidence for independent practice in any of the included procedures.

The majority of fellows (16/23) reported altering their practice as a result of taking the course. Eleven respondents (47%) sought additional flexible endoscopy cases within their service, one (4%) actively sought additional flexible endoscopy cases outside of their service, and two (9%) sought cases both within and outside of their service.

At the time of the follow-up survey, four (18%) respondents stated that they made additional partnerships with industry as a result of the course. Eight respondents (35%) stated that endoscopy influenced their job choice after fellowship. All respondents recommended the course for future MIS fellows.

Discussion

As previously reported, the SAGES Therapeutic Flexible Endoscopy Course for Fellows provides a substantial increase in procedural confidence after participating in the course [6]. Immediately following the 2-day course, the majority of fellows who would later respond to the 6-month follow-up survey reported feeling more than “somewhat

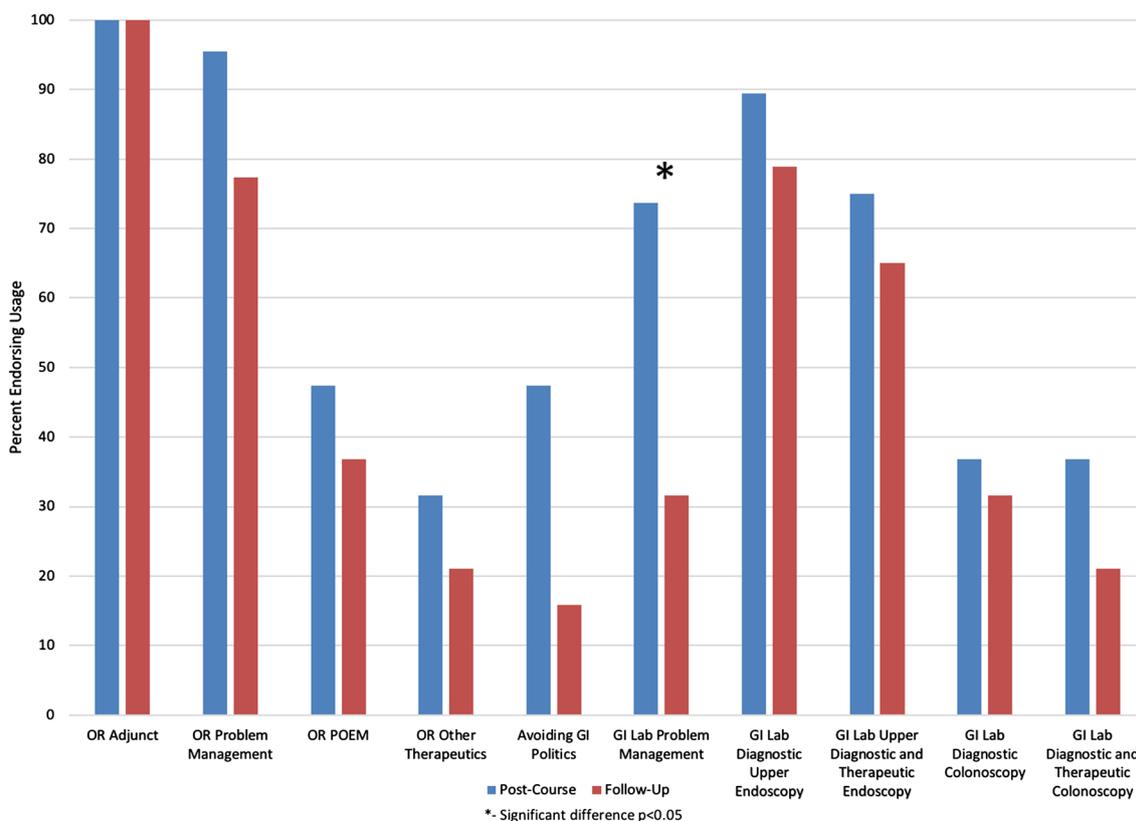


Fig. 2 Actual versus perceived uses of endoscopy

confident” on all included procedures, with the exception of EMR and per-oral endoscopic myotomy (POEM). This improved confidence seen immediately following the course was statistically similar 6 months later. Other studies looking into confidence and skill retention following intensive learning courses for medical students and residents have similarly demonstrated non-statistically significant decay at 6 months [7–9]. In these studies, the decay was most pronounced for skills that are not routinely practiced; however, even regularly used skills showed some decrement. Despite the decreases seen in our survey, the maintenance of confidence to practice over 68% of these procedures independently demonstrates a durable positive effect of the training.

For the subgroup of respondents who had passed FES at the time of the 6-month survey, no procedure had a statistically discernible drop in either Likert scores or proportion of respondents reporting a score of “somewhat confident” or above. This finding supports previously published data that FES passage strongly correlates to endoscopic technical skills [10]. The small sample sizes related to the fellowship subgroups did not allow for sufficiently powered analysis of the differences between the groups.

Beyond merely increasing confidence, over a third of respondents reported that the course contributed to their

career decision, and a majority reported that the course helped to drive them to seek out additional endoscopy cases. In addition, there were no barriers to practice that were more prevalent in the follow-up survey, with the exception of respondents who did not feel that endoscopy was important to their practice. Combined with the relative lack of difference between perceived and actual uses of endoscopy for the course participants, these findings suggest that the flexible endoscopy course provides long-lasting impact to surgeons’ careers.

These findings support the effectiveness of the 2-day SAGES flexible endoscopy course both to improve durably procedural competence in therapeutic endoscopy and to influence how endoscopy is planned to be used in independent practice. The program may serve as a useful adjunct to the FEC for those general surgery graduates who have completed it, or as a training modality for previously graduated surgeons who were not subject to the FEC requirement.

Although most elements of the course demonstrated durability over the 6 months following the course, several concerns remain. Of note, the statistically discernable decreases in confidence to independently perform colonoscopy with snare polypectomy and upper GI variceal bleeding represent important areas of emphasis for future

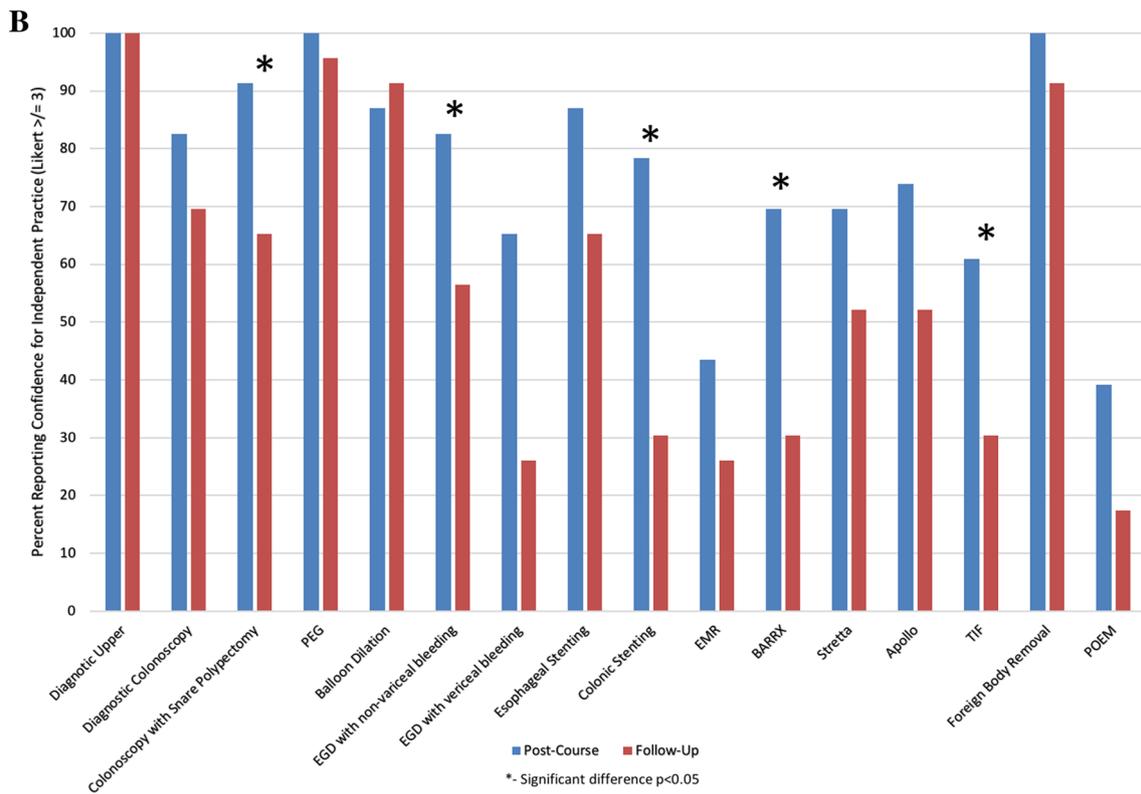
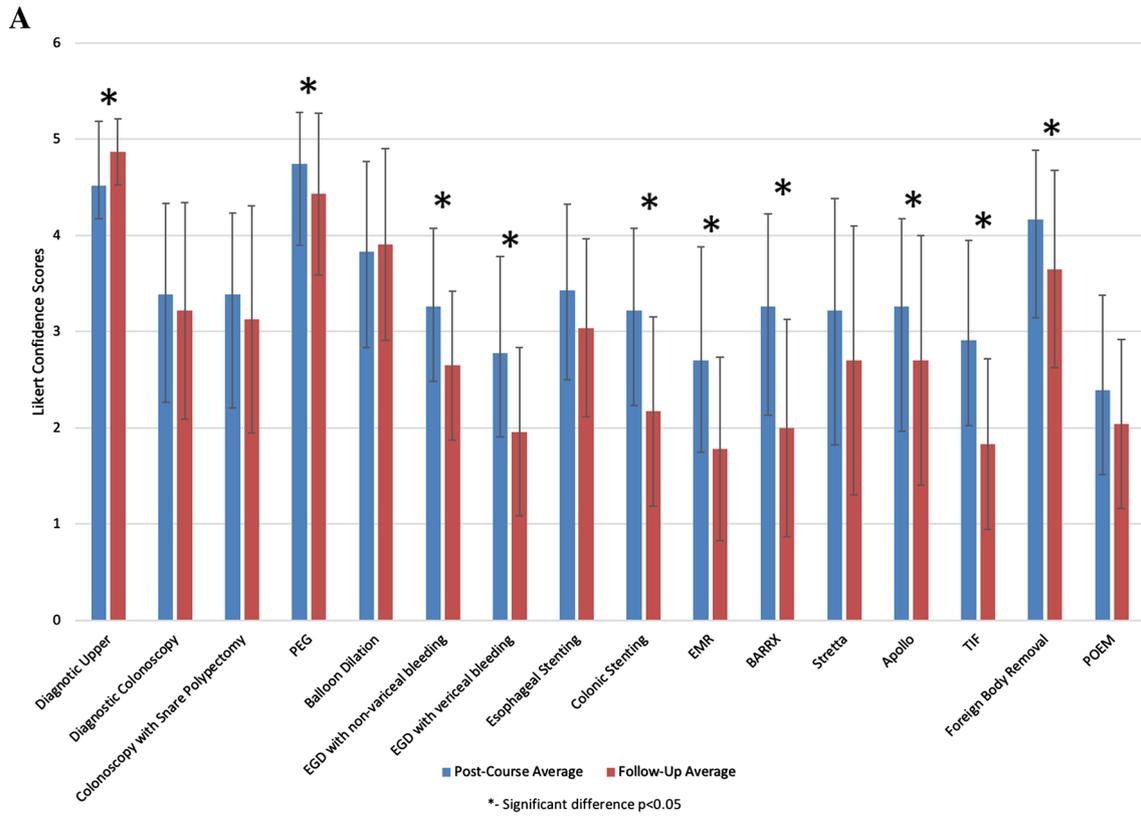


Fig. 3 **A** Likert confidence scores for procedures. **B** Percent reporting confidence for independent practice

iterations of the course. Part of this decrease may be due to the fact that 48% of the course participants had little to no experience with endoscopy in their fellowship prior to the course [6]. Similar to the laparoscopic skills examined by Maagaard et al., lack of previous familiarity with the procedure and lack of opportunity to practice during the intervening time period inevitably lead to decay in the skill set to pre-course skill levels [8]. As future participants in the SAGES endoscopy course will have the benefit of the complete FEC training requirement, and an associated increase in prior endoscopy experience, small shifts in emphasis during the course may help mitigate these losses. Overall, however, the SAGES endoscopy course performs similarly to other boot camp-style courses in immediate and intermediate-term results.

This study is limited in that the respondents were not assessed on their actual performance of the procedures, but rather only assessed their confidence level. Additionally, several of the respondents reported taking an additional endoscopy course in the intervening 6 months, which may result in additional downstream effects from the course. The relatively small number of respondents and their mix of specialties did not yield large enough sample sizes for adequately powered comparisons between fellowship types. While our response rate was only 40%, it is higher than the typical online survey response rate of 30% for general surgeons [11].

Conclusions

Building on previous work regarding the effectiveness of the SAGES Therapeutic Flexible Endoscopy Course for Fellows, this study demonstrates the durability of the confidence gained through the program and highlights the impact it has on practice patterns of participants. This course continues to provide value not only to the society and to industry partners but to patients as well.

Acknowledgements The authors wish to thank the participants in the 2016 SAGES Endoscopy Course for Fellows for their participation in the course evaluations and follow-up surveys.

Compliance with ethical standards

Disclosures Dr. Dunkin serves as a consultant for and has received honoraria from Olympus, Boston Scientific, Medtronic, and Ethicon. He has served as a consultant for Pacira. He is the Executive Vice President of SurgWise Consulting. None of these relationships had any impact on the conduct or design of the above work. Dr. Gardner is the President and CEO of SurgWise consulting. This relationship had no impact on the conduct or design of the above work. Dr. Kucera, Dr. Nealeigh, and Dr. Ritter have no conflicts of interest or financial ties to disclose.

Appendix 1: questionnaire elements

- Rate the extent to which these potential barriers affect practice (1 = not at all, 2 = minimally, 3 = somewhat, 4 = moderately, 5 = very)
 - Competition with GI colleagues
 - Hospital Credentialing
 - Lack of opportunities to gain adequate skills
 - Not confident in skills
 - Not important to practice
 - Inadequate resources
- How are you currently using endoscopy in your practice/fellowship
 - In the OR
 - Adjunct to surgical procedure
 - Manage problems related to surgery
 - Per-oral endoscopic myotomy (POEM)
 - Other therapeutic procedures
 - In the GI Lab
 - Manage problems related to surgery
 - Diagnostic upper endoscopy
 - Diagnostic and therapeutic upper endoscopy
 - Diagnostic colonoscopy
 - Diagnostic and therapeutic colonoscopy
- Rate your current level of confidence performing each of the following procedures (1 = not at all, 2 = minimally, 3 = somewhat, 4 = moderately, 5 = very)
 - Diagnostic upper endoscopy
 - Diagnostic colonoscopy
 - Colonoscopy with snare polypectomy
 - Percutaneous endoscopic gastrostomy (peg)
 - Balloon dilation of stricture
 - Upper endoscopy with management of non-variceal bleeding
 - Upper endoscopy with management of variceal bleeding
 - Esophageal stenting
 - Colonic stenting
 - Band endoscopic mucosal resection (EMR)
 - Balloon radiofrequency ablation of esophageal mucosa (Barrx™; Medtronic, Fridley, MN)
 - Lower esophageal sphincter radiofrequency therapy (Stretta®; Mediri Therapeutics, Greenwich, CT)
 - Use of Apollo OverStitch™ Device (Apollo Endosurgery, Austin, TX)
 - Use of Esophyx™ Device for TIF (Endogastric Solutions, Redmond, WA)

- Foreign Body Removal
- Per-oral endoscopic myotomy (POEM)
- Have you modified your fellowship experience as a result of this course
 - Did not do anything different as a result of the course
 - Actively sought additional flexible endoscopy cases outside of my service
 - Arranged to do a flexible endoscopy rotation at my institution
 - Arranged to do a flexible endoscopy rotation at another institution
 - Actively sought additional flexible endoscopy cases on my service

References

1. Halverson AL, Hughes TG, Borgstrom DC, Sachdeva AK, DaRosa DA, Hoyt DB (2013) What surgical skills rural surgeons need to master. *J Am Coll Surg* 217:919–923
2. Valentine RJ, Jones A, Biester TW, Cogbill TH, Borman KR, Rhodes RS (2011) General surgery workloads and practice patterns in the United States, 2007 to 2009. *Ann Surg* 254:520–526
3. Hazey JW, Marks JM, Mellinger JD, Trus TL, Chand B, Delaney CP, Dunkin BJ, Fanelli RD, Fried GM, Martinez JM, Pearl JP, Poulouse BK, Sillin LF, Vassiliou MC, Melvin WS (2014) Why fundamentals of endoscopic surgery (FES)? *Surg Endosc* 28:701–703
4. The American Board of Surgery (2017) Flexible endoscopy curriculum for general surgery residents. <https://www.absurgery.org/xfer/abs-fec.pdf>. Accessed 9 May 2018
5. The American Board of Surgery. The American board of surgery training requirements. http://www.absurgery.org/default.jsp?certsqe_training. Accessed 9 May 2018
6. Gardner AK, Marks JM, Pauli EM, Majumder A, Dunkin BJ (2017) Changing attitudes and improving skills: demonstrating the value of the SAGES flexible endoscopy course for fellows. *Surg Endosc* 31:147–152
7. Scott TM, Hameed SM, Evans DC, Simons RK, Sidhu RS (2008) Objective assessment of surgical decision making in trauma after a laboratory-based course: durability of cognitive skills. *Am J Surg* 195:599–603
8. Maagaard M, Sorensen JL, Oestergaard J, Dalsgaard T, Grantcharov TP, Ottesen BS, Larsen CR (2011) Retention of laparoscopic procedural skills acquire on a virtual-reality surgical trainer. *Surg Endosc* 25:722–727
9. Okusanya OT, Kornfield ZN, Reinke CE, Morris JB, Sarani B, Williams NN, Kelz RR (2012) The effect and durability of a pre-graduation boot camp on the confidence of senior medical student entering surgical residencies. *J Surg Educ* 69:536–543
10. Mueller CL, Kaneva P, Fried GM, Feldman LS, Vassiliou MC (2014) Colonoscopy performance correlates with scores on the FESTTM manual skills test. *Surg Endosc* 28:3081–3085
11. Cunningham CT, Quan H, Hemmelgam B, Noseworthy T, Beck CA, Dixon E, Samuel S, Ghali WA, Sykes LL, Jette N (2015) Exploring physician specialist response rates to web-based surveys. *BMC Med Res Methodol* 15:32