International Journal of Surgery 53 (2018) 137–142

Contents lists available at ScienceDirect

International Journal of Surgery

journal homepage: www.elsevier.com/locate/ijsu

Original Research

Consensus views on the optimum training curriculum for advanced minimally invasive surgery: A delphi study

Mina Awad[a], Fady Awad[b], Fiona Carter[c], Bethan Jervis[d], Sonja Buzink[e], Jake Foster[f], Jack Jakimowicz[e], Nader K. Francis[d,g,*]

[a] Torbay Hospital, Lowes Bridge, Torquay, Devon, TQ2 7AA, UK
[b] Royal Devon &Exeter NHS Foundation Trust, Barrack Road, Exeter EX2 5DW, UK
[c] South West Surgical Training Network, Yeovil, BA21 4AT, Somerset, UK
[d] Yeovil District Hospital, Higher Kingston, Yeovil, BA21 4AT, Somerset, UK
[e] Faculty of Industrial Design Engineering, Delft University of Technology, Landbergstraat 15, 2628 CE Delft, The Netherlands
[f] Poole Hospital, Longfleet Road, Poole, Dorset, BH15 2JB, UK
[g] University of Bath, Wessex House, Bath, BA2 7AY, UK

ARTICLE INFO

Keywords:
Minimal invasive surgery
Curriculum
Laparoscopic
Training

ABSTRACT

Introduction: There has been a wide uptake in the use of Minimal Invasive Surgery (MIS) globally across different surgical specialties. Whilst evidence exists for a structured training curriculum for basic laparoscopic surgery, there is little agreement on a complete framework for an advanced MIS training curriculum, defining the essential elements of the curriculum including the optimal assessment methods. The aim of this study is to obtain a consensus on the essential elements of a training curriculum for advanced MIS.

Materials and Methods: A Delphi study was carried out involving 57 international experts in advanced MIS across different surgical specialties. A three round survey was conducted to reach consensus on the essential domains of a curriculum. This included defining the learners, trainers and training centres; curriculum content and competency based assessment.

Results: Unanimous agreement was reached for the completion of basic laparoscopic training before entry into advanced training. A trainer should have reached competency in advanced MIS and attended a 'Train the trainer' course. The curriculum should be delivered as modular training, including a multi-modal approach with a structured clinical proctorship programme. Formative assessment was considered as an integral part of learning and should be performed using objective work based assessment tools such as global assessment scale (GAS) forms. Accreditation in advanced MIS can be achieved by objective assessment of technical performance of unedited videos in addition to key clinical performance outcomes.

Conclusion: A consensus on the framework of an advanced MIS training curriculum has been achieved defining the essential elements of entry criteria, selection of trainers and training units and curriculum content. Multimodal learning, clinical proctorship programme and competency based assessment are integral parts of the curriculum.

1. Introduction

Over the past few decades, there has been a wide uptake of minimal invasive surgery (MIS) globally and its use has replaced conventional open surgery in several specialties. The benefits of its use as compared to open surgery are well documented including shorter hospital stay [1], reduction in blood loss, post-operative pain and infection rates [2,3]. Its use has also extended from minor ambulatory surgery such as cholecystectomy and appendectomy into more advanced resections of advanced cancer and benign conditions across all surgical fields, including colorectal surgery [4–6], hepatobiliary surgery [7,8], upper gastrointestinal surgery [9,10], urology [11,12] and gynaecology [13,14].

This rapid expansion of the application of laparoscopic surgery has been coupled with training challenges, particularly for advanced MIS, which requires a long learning curve [15,16]. With the rapid development in surgical technology and techniques and an increasing demand for MIS, it has become essential to ensure that surgeons are optimally trained to ensure patient safety.

Training basic laparoscopic surgical skills has been well addressed

* Corresponding author. Yeovil District Hospital, Higher Kingston, Yeovil, Somerset, BA21 4AT, UK.
E-mail address: nader.francis@ydh.nhs.uk (N.K. Francis).

https://doi.org/10.1016/j.ijsu.2018.03.039
Received 23 October 2017; Received in revised form 9 February 2018; Accepted 19 March 2018
Available online 23 March 2018

in the literature, supported by the availability of virtual reality simulators [17,18], box trainers [19] and animal models [20]. There are also recognised models and curricula to teach basic laparoscopic skills [21]. However, there is a paucity of evidence to guide training on advanced MIS.

This could be explained by the fact that basic laparoscopic skills are now an integral part of the training curricula in residency and most residents master basic laparoscopic skills during their training. However, with the reduction in training time after the application of working time regulations [22], additional training may be required for advanced MIS skills. Traditionally, training in advanced MIS is often carried out in a dedicated fellowship scheme after completion of training such as in bariatric, upper and lower gastrointestinal, hepatobiliary, urology and Gynaecology surgery [23–25]. Although some fellowship schemes outline clear aims and objectives for the planned training period, there is no recognised structure or a framework for an optimum training curriculum in advanced MIS that can guide on the selection of the learners, define the trainers and more importantly, guide on the assessment process to ensure the delivery of learning objectives. The situation has even greater challenges for teaching accredited specialists or consultants who wish to undertake further training in advanced MIS such in colorectal surgery, transanal total mesorectal excision [26], bariatric surgery and other MIS surgery as there is no recognised structured training or a pathway that can guide for continued professional development (CPD). In England, a nationally funded training programme for laparoscopic colorectal surgery (LAPCO; Coleman CRD 2008) has been implemented for accredited consultants wishing to undertake further training in laparoscopic colorectal surgery. Although it is likely that other specialties would adopt similar models, there is no evidence to guide on the optimum framework of an educational curriculum in other MIS specialties. The aim of this study was to obtain consensus from a wide group of MIS experts across all specialties on the essential domains of a training curriculum that can guide learners undergoing advanced MIS training.

2. Materials and methods

2.1. The Delphi technique

The Delphi technique was used in this study. This technique involves a reiterative process of interrogation of a group of experts. Expert opinion from various sources is combined using qualitative then quantitative methods with the aim of converging on a shared consensus result [27,28]. Notable characteristics of the Delphi technique include: anonymity, controlled feedback of opinion, reiteration of concept and potential for application of statistical analysis techniques.

2.2. Experts

121 experts were invited to take part in this study. Experts in this study were selected based on their peer standing as excellent technical laparoscopic surgeons or have an established track record of involvement in surgical training. Experts included consultant clinicians, educationalists and academic experts as well as multidisciplinary team representatives from several different centres. Experts were recruited from different surgical specialties including upper and lower gastrointestinal surgery, hepatobiliary, urology and gynaecology.

3. Definition of MIS

MIS was defined in this study as any MIS surgical procedure that encompassed the conventional and single port laparoscopic surgery, natural orifice and robotic surgery. Advanced MIS included any MIS surgical procedures that are beyond basic operations (diagnostic laparoscopy; appendectomy; cholecystectomy). Advanced MIS in this context included all sub-specialities such as Upper GI, lower GI, hepatobiliary, bariatric, vascular, urology and gynaecology MIS surgery.

3.1. First round

The first round questionnaire consisted of several open ended questions on 4 key domains including: (i) entry criteria for advanced MIS training; (ii) selection of trainers and criteria for identifying a training unit; (iii) curriculum content and (iv) methods of assessment including competency based assessment.

Open questions were formulated and experts were invited by e-mail to complete an online questionnaire using Survey Monkey or to complete a paper version and return by post. Non-responders received two reminders by e-mail after 15 days. The responses to this first round were then grouped together to generate a limited number of statements or choices to form the second-round questionnaire.

3.2. Round 2 and 3

The second round questionnaire was sent to all experts who participated in round one and respondents were asked whether they agreed or disagreed on statements generated from the first round. The responses from the second round were grouped using the same categories as the previous round to generate the third round questionnaire. Reminder emails were sent to non-responders as in the previous round.

All responses from round 2 that reached an agreement of above 55% were used in the third round to obtain a final consensus on a curriculum for advanced MIS. Experts in the third round were asked to score each statement from 1 (strongly disagree) to 5 (strongly agree). Participants were also given the opportunity to make any additional suggestions or recommendations on how to implement the curriculum.

3.3. Data analysis and study steering group (SSG)

Data analysis was based on percentage response rates and a weighted average score was calculated for each statement. A percentage response of over 55% was taken to be a positive verdict and a response rate of over 70% was categorized as a ‘majority positive verdict’ [27]. The project SSG involved two expert laparoscopic surgeons (JJ and NF); trainee representatives (JF and others) and experts in training and education in MIS (FC and S). The whole group reviewed the questionnaires in every round to ensure the readability and acceptability of each item in the survey. NF, FC, MA and FA were in charge of designing the questionnaires and collating the results. MA and FA helped with analysis of the survey results and drafting the manuscript.

4. Results

Fifty seven experts (47%) responded to the study representing nine countries including: France, Spain, Holland, Denmark, Italy, Greece, Romania and Israel in addition to the United Kingdom. The experience of the experts in teaching advanced MIS ranged from five to twenty-nine years.

The responses to the first two rounds are outlined in Appendix 1. One hundred and eighteen statements were proposed by the experts in the first round outlining the main elements of the training curriculum for advanced MIS. The statements were grouped under four main domains: (i) 54 statements were made for entry criteria; (ii) 49 statements were made for selection of mentors and selection and quality assurance of a training unit; (iii) eight statements were suggested for the curriculum content and (iv) seven statements were put forward for designing a competency based assessment.

In the second round, only 53 statements across the four domains of the curriculum were selected and agreed upon by the experts. The statements and responses are outlined in appendix 1.