

Assessing the Knowledge Base and Impact of Training on Minimal Access Surgery among Healthcare Providers in a Poor Resource Setting

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Abstract

Background: Minimal access surgery (MAS) skills are unique and different from those of traditional “open” surgery. Surgeons need to effectively acquire and update their surgical skills and procedures in minimal access surgery (MAS) via comprehensive courses in MAS, conferences, workshops, live surgeries and symposia. However, the impact of these comprehensive courses in both basic and advanced minimal access surgeries on health care workers, surgeons’ knowledge, skills, and practice has not been clearly established. **Aim:** To determine the impact of a three day MAS workshop on the knowledge base of health care workers. **Methods:** This was an analytical single arm prospective cohort study design. A total of 54 health-care workers (HCW) from Obstetrics/gynecology and Surgery departments in different regions of the country participated in the three day workshop of which 37 were doctors and 17 were nurses. The workshop consisted of lectures, videos, and live surgeries. We completed a survey of all participants who attended the 3-day workshop on basic minimal access surgery (MAS) held in Alex-Ekwueme Federal Univer-

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sity Teaching Hospital Abakaliki, Nigeria. Our survey method included a pre-workshop set of 20-item self-reporting questions on the socio-demography, professional demography, previous training experience and knowledge of basic minimal access surgery principles were answered prior to commencement of the training and after the training. Scores before and after the training were compared and the results were analyzed using chi square for categorical values and T test for continuous variables. P-value < 0.05 was set as level of significance. **Results:** Of all the 54 workshop attendees, we received 22 responses (response rate 40.7%). Ten males and 12 females responded. Ten of the respondents were surgeons: 6 resident doctors and 4 consultants, while 12 were nurses. The result of our study showed that mean post-workshop ($P \leq 0.001$) survey score was significantly higher than pre-workshop survey mean score. As a result of participating in the workshop, respondents perceived a substantial improvement in their basic minimal access surgery knowledge. Each professional knowledge assessment of the respondent also showed a significant post-workshop mean score ($P \leq 0.002$ & 0.001) respectively when compared with the pre-workshop score. **Conclusion:** Workshop in MAS has an appreciable and a significant impact on the knowledge base of HCW.

Keywords

Healthcare Workers, Knowledge, Workshop

1. Introduction

Surgeons need to effectively acquire and update their surgical skills and procedures in minimal access surgery (MAS). Presently, these can be achieved through some educational methods like traditional continuing medical education symposia, instructional videos, mentoring, and comprehensive courses which combine lectures, skills laboratories, and live surgery and MAS workshops, but these skills are not without potential risks that can be devastating [1]. Because the skills required to perform minimal access surgery (MAS) are unique, it has prompted the surgical community to reconsider the approach to training, knowledge, and skills assessment in minimal access surgery [2]. It is very essential to possess basic MAS skills before mastering any procedural skills. One of the objective ways to assess the knowledge impact is by assessing your participants' knowledge before and after an educational or workshop training. The need for technical competence demonstration by both surgical trainees and practicing surgeons should be highlighted [3]. The impact of comprehensive courses in both basic and advanced minimal access surgeries on health care workers, surgeons' knowledge, skills, and practice has not been clearly established [1]. This study is set to determine the impact of a three day MAS workshop on the knowledge base of health care workers.

2. Techniques of MAS

MAS skills are unique and different from those of traditional "open" surgery. The

optical systems provide monocular vision that eliminates depth perception, therefore, the surgeon depends on light and shading to recreate a “stereoscopic” environment [4]. MAS uses a video image that is magnified and projected onto a monitor which is not aligned precisely with the surgical target.

The long working instruments and trocars amplify movements and tremor, which are more difficult to control than traditional instruments. The trocars are fixed to the body wall and this decreases range of motion and imposes some technical challenge. Passing instruments through the trocars result in the fulcrum effect, as the surgeon’s hand must be moved 180° opposite the direction of the desired movement of the tip of the instrument [5]. The effect of the long instruments dampens tactile sensation making the surgeon to rely mainly on their sense of touch to define tissue planes, pathology, and the resistance required in securing knots. Cues such as touch and the interaction of specific instruments with tissue must be learned to help maintain the necessary tactile feedback [5]. All these challenges have necessitated evaluation of the skills and training to avert devastated complications during surgeries. Some regulatory bodies in MAS training are already in place; Society of Gastrointestinal and Endoscopic Surgeons (SAGES) and the European Association of Endoscopic Surgeons (EAES) stipulate minimum requirements for those learning MAS with an emphasis on training both in the operating theatre and in the skills courses [6] [7].

3. Methods

This was an analytical single arm prospective cohort study design. Fifty-four doctors and nurses from both surgery and Obstetrics/gynecology who participated in a 3-day MAS workshop were assessed. The inclusion of the distributed participants is based on their key roles in MAS and the need expand their skills in the training center. The workshop consisted of lectures, videos, and live surgeries. The trainers consisted of experienced MAS specialist surgeons, anesthetists, experienced MAS nurses, who practice in both government and private hospitals. We completed a survey of all participants who attended the 3-day workshop on basic minimal access surgery (MAS) held in Alex-Ekwueme Federal University Teaching Hospital Abakaliki, Nigeria. Our survey method included a pre-workshop set of 20-item self-reporting questions on the socio-demography, professional demography, previous training experience and knowledge of basic minimal access surgeries principles; introduction to minimal access surgery, access, instrumentation, pneumoperitoneum, and indications that were answered prior to commencement of the training and after the training. Scores before and after the training were compared and the results analyzed Using chi square for categorical values and T test for continuous variables. P-value <0.05 was set as level of significance.

4. Results

Of all the 54 workshop attendees, we received 22 responses (response rate 40.7%).

Ten males and 12 females responded (**Table 1**). Ten of the respondents were surgeons: 6 resident doctors and 4 consultants, while 12 were nurses (**Table 1**). Reason for only 22 respondents could be attributed to lack of interest in the non-respondents.

Table 1. Demographic data of Participants.

Sex	Consultant	Resident	Nurses
Male (N = 10)	3	5	2
Female (N = 12)	1	1	10
Total (N = 12)	4	6	12

The result of our study showed that mean post-workshop ($P \leq 0.001$) score was significantly higher than pre-workshop mean score (**Table 2**). As a result of participating in the workshop, respondents perceived a substantial improvement in their basic minimal access surgery knowledge (**Table 2**).

Table 2. Overall Comparison.

Test	Mean (\pm SD)	N	P-value
Pretest	4.95 (\pm 1.93)	22	
Posttest	7.23 (\pm 1.74)	22	0.001

Each professional knowledge assessment of the respondent also showed a significant post-workshop mean score ($P \leq 0.002$ & 0.001) respectively when compared with the pre-workshop score (**Table 3**).

Table 3. Comparison of profession.

Test type	Profession	N (21)	Mean (\pm SD)	P-value
Pretest	Doctor	10	6.44 (\pm 1.24)	0.002
Post-test	Doctor	10	8.11 (\pm 1.62)	
Pretest	Nurse	12	4.08 (\pm 1.47)	0.001
Post-test	Nurse	12	6.83 (\pm 1.62)	

5. Discussion

Impacting surgical skills is one of the most important aspects of surgical training. Several foreign studies have already established a formal program in their syllabus on this, though with slight differences [8]-[10]. The role of short courses or workshops in advanced MAS surgery has been assessed. Heniford and colleagues examined the impact of 1-day courses with and without follow-up preceptor programs [11] [12]. They found that course attendees who were subsequently preceptor were more likely to incorporate procedures into their own practice. They also found that surgeons with greater pre-course surgical experience in advanced MAS techniques were also more likely to complete advanced MAS procedures after a course. Similarly, Khan *et al.* explored enhanced knowledge and skills of surgical residents in MAS using a 1-day laparoscopic skill workshop [13]. They found sig-

nificant improvement in knowledge and psychomotor skills of the surgical residents. In this study there was significant improvement in the knowledge of MAS surgery after the workshop though skills of MAS were not accessed.

Menezes *et al.* assessed the deficiency in knowledge of basic principles of laparoscopy among attendees of advanced laparoscopic surgery course using a structured questionnaire [14]. They found out that basic laparoscopic knowledge among attendee were suboptimal and suggested a review of basic principles of laparoscopy. The workshop was designed to take care of basic MAS principles; introduction to minimal access surgery, access, instrumentations, pneumoperitoneum, and indications.

The most appropriate method for training and assessment of trainee in MAS is yet to be established, with each country having a peculiar way of assessing their trainees. Aggarwal *et al.* showed the need to develop an indigenous evidenced-based virtual reality of laparoscopic training curriculum for novice laparoscopic surgeons to achieve proficient skill prior to participating in live surgeries [15]. Their result showed that it improves technical skills of surgical trainees. In a similar manner, Ji-Hui *et al.* evaluated the changes in Laparoscopic Surgery Education in China over 15 years period and the use of indigenous techniques in developing the local educational systems [16]. They heavily used communication through conferences and workshops as a teaching method in laparoscopic surgery education in combination with stimulators developed by Chinese surgeons and it led to the fast development of laparoscopic surgery in China. In this study, we have shown that a comprehensive course in basic MAS improves the knowledge of MAS and this can preempt the participants to complete advanced MAS training using our own structured questionnaire.

Prospects: This training is to be repeated annually with progression to hands-on-training workshop. The target is to enroll every resident doctor that passes through this institution into acquiring the skills of MAS and in the long-run, making our center a MAS training institution.

6. Conclusion

There was an appreciable and significant improvement in the knowledge base of HCW in MAS following the three day workshop which is paramount to advanced training in minimal access surgery.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Pre-Test for Mas Workshop

1. Age.....
2. Sex.....
3. Profession
 - A. Doctor
 - B. Nurse
 - C. Other health Professional
4. Cadre
 - A. Consultant
 - B. Resident doctor
 - C. Senior Nurse (specify)
 - D. Junior Nurse
5. Specialty
 - A. Surgery
 - B. Obs & Gynae
6. Have you had any training in MAS in the past?
 - A. Yes
 - B. No
7. If yes in “6”, what level of training did you have?
 - A. Basic
 - B. Intermediate
 - C. Advanced
 - D. All of the above
8. If yes in “7”, which specialty where you trained?
 - A. General Surgery
 - B. Urology
 - C. Obs & Gynae
9. Were you satisfied with the training?
 - A. Yes
 - B. No
10. The following are complications of laparoscopic operations with relevance to anaesthesia:
 - A. Hypotension
 - B. Hypertension
 - C. Hypercapnia
 - D. Hypoxaemia
 - E. Gas embolism
11. The following are anaesthesia contraindications for laparoscopic surgery:
 - A. Congestive heart disease
 - B. Ischemic heart disease
 - C. Pregnancy
 - D. Obstructive and restrictive pulmonary disease

- E. Right to left shunt
12. The ideal height of the irrigant fluid tower is:
- A. 30 - 40 cm
 - B. 60 - 80 cm
 - C. 100 - 120 cm
 - D. 150 - 170 cm
13. Which of the following is not an irrigant fluid for monopolar TURP
- A. 1.5% Glycine
 - B. 5% Dextrose
 - C. Normal Saline
 - D. Cytal
14. TURP is contraindicated in patients with
- A. BPH and bladder stones
 - B. Ankylosis of the HIP
 - C. Neurogenic bladder
 - D. BPH and incomplete short segment urethral stricture.
15. Which statement is untrue concerning TURP
- A. The median lobe should be resected first.
 - B. The limits of resection are the verumontanum and ureteric orifices.
 - C. The critical landmarks that need to be identified are the verumontanum, external sphincter and ureteric orifices.
 - D. Apical tissue should be resected last.
16. The following are true in monopolar electro-surgical:
- A. Easy to use
 - B. Uses cutting and coagulation
 - C. Has dissecting capabilities
 - D. Larger volume of tissue injured
 - E. Can interfere with pacemakers
17. Complications associated with electro-surgery include the following:
- A. Overshooting.
 - B. Over cooking.
 - C. Direct coupling.
 - D. Insulation failure.
 - E. Capacitative coupling.
18. One of the following is not part of the set-up for general surgery laparoscopy:
- A. Monitor
 - B. Camera unit
 - C. Insufflator
 - D. Electrocautery
 - E. None of the above
19. Which of the above port sizes are commonly used in general surgery laparoscopy
- A. 5 mm

- B. 10 mm
 - C. 12 mm
 - D. All of the above
20. Thyroidectomy can be also be done endoscopically
- A. True
 - B. False