

Application of precise training to surgical endoscopic nurses training

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Abstract. Minimally invasive surgery is an inevitable trend of the development of surgery, the scope of endoscopy surgery application has been covering the whole departments of surgery, which also put forward higher requirements on the nursing coordination during surgery, training high-quality endoscopy nurses is a focus of the researchers. In the paper, the precise training mode was applied to the professional training process of endoscopy nurses, the systematic training of endoscopy nurse was conducted from the following three aspects, including the precision of teaching, the precision of operative cooperation, and the precision of assessment, which had gained good effects. The research indicated that the precise training mode can contribute to upgrading various capacities of endoscopy nurses in the operating room, and improving the teaching quality and effect of specialized training, suggesting a good application effect.

1 Introduction

With the development of endoscopy, the applicability of endoscopic surgery has gradually broadened and now covers almost all disciplines of surgery, with the inevitable trend of minimally invasive surgery in the development of surgical operations. The application and update of advanced equipment and devices have also accelerated the development of the quality of endoscopic surgery. Rapid development of endoscopic surgery has also put forward higher requirements for the cooperation of operating room (OR) nursing [1]. OR nurses should not only have a strong sense of responsibility, but also should have a wealth of knowledge and specialist skills. Also, the demand of high-quality specialized endoscopy nurses in operating room continues to grow. How to efficiently train the specialized OR nurses, has always been the issue of concern for managers. In our hospital, the specialized OR management was implemented in May 2013, and the specialized endoscopic group was established at the same time. In August 2014, the precision training was applied in the training of specialized endoscopy nurses and achieved good results. And this project of precision training will be introduced and reported as follows in this article.

2 Information and methods

2.1 General information

Our hospital is now a comprehensive Grade III Level A Teaching hospital with a total of 36 operating rooms and more than 3,000 cases of endoscopic surgeries annually. These endoscopic surgeries include: laparoscopy in general surgery, urological endoscopy, thoracoscopy, gynecological

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endoscopy, micro-endoscopic discectomy (MED), arthroscopy and laparoscopic thyroidectomy, etc. Currently, there are 1 group leader and 8 group members in the specialized endoscopic group, including 3 nurses-in-charge and 6 nurse practitioners. 30 subjects were selected from the nurses in the rotating training in different specialized departments of operating rooms and the nursing students of the training base for specialized operating rooms during May 2013 - July 2014 as the control group, and received conventional specialized training for operating room nursing, instead of precision training. And 34 subjects were selected from the nurses in the rotating training in different specialized departments of operating rooms and the nursing students of the training base for specialized operating rooms during August 2014-October 2015 as the experimental group, and received precision training. The differences in age, gender, education level, working hours and other general information between the two groups of nurses were not statistically significant ($P>0.05$), while the data were comparable.

2.2 Methods

2.2.1 Conventional specialized training

The training period was 7 months, including 1.5 months of theoretical classes with centralised teaching of the knowledge of the types of endoscopic equipment and the subspecialties of endoscopic surgeries, and 5.5 months of practices and exercises in the form of conventional teaching and rotating in different departments to practice the operations of all endoscopic equipment and the cooperation in the subspecialties of endoscopic surgeries.

2.2.2 The framework of precision training

2.2.2.1 The precision in teaching and learning

(1)The precision of the training content and scheduling. The teaching and learning contents were made explicit for each training period: 1.5 months of theoretical classes totally broke away from the classroom type of teaching. During Week 1 and 2, the supervisor of the department of medical devices and the technicians of major brands of endoscopic equipment gave detailed introductions of the type, model, size and purpose, the methods of use, installation and disassembly, cleaning and disinfection, as well as the methods of maintenance of each equipment. During Week 3 and 4, the students were grouped to learn the properties, functions, intraoperative applications and simple trouble shooting solutions of all equipment, and to observe the whole processes of all the subspecialties of endoscopic surgeries. In Week 5 and 6, the clinicians and anesthesiologists taught the students the knowledge of anatomy, medicine, surgery, therapy, anesthesia and other related areas, and introduced the latest treatments and technologies, as well as the training for scientific innovations and writing. During the remaining 5.5 months, the student took rotations in various subspecialties of endoscopic surgeries. Group members of the specialized endoscopic group taught the perioperative cooperation, and the students should become familiar and skilled in the methods of operative cooperation and procedures of all subspecialties of endoscopic surgeries. The schedule of the rotations in the subspecialties of endoscopic surgeries was: 8 weeks for laparoscopy in general surgery, 3 weeks respectively for urological endoscopy, thoracoscopy and gynecological endoscopy, 2 weeks respectively for micro-endoscopic discectomy (MED) and arthroscopy, as well as 1 week for laparoscopic thyroidectomy. (2) The precision of the mentors: Before the start of training, the group members of the specialized endoscopic group were assessed by group leader and the head nurses of all departments, for the evaluation of the specialized knowledge and skills for the subspecialties, and the mentors were determined according to the results of the assessment in the areas that they were good at. Meanwhile, the whole-process mentor responsibility system was implemented with 1 mentor responsible for 2-3 students, to help the students develop learning plans, to keep up with the students' learning status and results, to timely solve the problems of the students encountered in training [2], and to participate in

the evaluation of students during the whole process. (3) The precision of the utilization of learning resources With the department resources, various forms of learning and multimedia teaching were carried out: multimedia network teaching was applied to introduce the specialized knowledge and cutting-edge technologies. Lectures and Seminars: the surgeons and specialized senior nurses gave lectures on the diseases of the specialties, the treatments, surgical procedures and nursing knowledge, with the database resources, network teaching videos as the supplement to specialized knowledge. Also, the illustrated brochures of the equipment and devices were made [3, 4], together with the graphics of the operation flow charts stored in the operating rooms, easy for students to learn and check at any time.

2.2.2.2 The precision of operative cooperation

All the procedures and processes of operative cooperation were integrated into precision operation: (1)Preoperative period: the preparation of the operation with standardized procedures of material preparation. All the things needed for the subspecialties of endoscopic surgeries were arranged and displayed according to the unified standards. The specifications of the standards of the preparation procedures were made accordingly for the preparation of the endoscopic equipment, devices, dressings and disposable supplies. The practices of all subspecialties of endoscopic surgeries were all standardized accordingly, so as to quickly and accurately complete the preparation and to improve efficiency. The standardized procedures of patient positioning: the surgical positions of the subspecialties of endoscopic surgeries were standardized with the specifications on the placement of the position mats and the restraints; the surgical positioning methods were completed into details and made into illustrated brochures for the students to check. The standardized procedures of patient positioning could improve the standardization and qualification level of surgical positioning. (2) Medium-term: the intraoperative phase. The standardized procedures of operative cooperation were established, and the devices were placed and passed in accordance with intraoperative processes accordingly. Meanwhile, the emergency response procedures were also set up to cope with the sudden changes of operative methods during the endoscopic surgeries such as the conversion from laparotomy to laparotomy. The sudden changes in the situation, the surgical instruments and the surgical positioning require accurate and quick responses of the nurses for smooth coordination. Besides, the failures of the endoscopic equipment and devices need timely and accurate solutions by the nurses. Therefore, the emergency response measures should be established for timely and accurate responses in case of emergencies, to improve the response capacity of endoscopy nurses, so as to ensure smooth operations. (3) Later stage: postoperative equipment and device processing. The standardized procedures of the cleaning and disinfection methods of endoscopic equipment and devices were established to standardize the disassembly, cleaning and disinfection, as well as the maintenance of the endoscopic equipment and devices [5], in order that the endoscopy nurses could quickly master the effective methods of cleaning and disinfection as well as routine maintenance measures.

2.2.2.3 The precision of assessment and evaluation

The precision assessment system was established by formulating the evaluation sheets by the group leader and group members of the specialized endoscopic group, including the evaluation of professionalism, expertise, preoperative preparation, equipment & device usage, operative cooperation, surgical positioning, and emergency responses, and so on. (1) The assessment by the mentor: during the theoretical learning stage, the mentors should conduct regular student assessment within the responsibilities, mainly in the form of theoretical questions, and should help the students with the weak parts. During the period of practice and exercise, after the completion of one subspecialty, the responsible mentor should conduct the subspecialty assessment of the students, with the records given objectively according to the professional knowledge and the operative cooperation abilities. (2) Self-assessment by the students: after the completion of the studies in one subspecialty, the students should

do self-assessment according to the evaluation sheets, for the review and summary of the studies during this stage. The students should also make presentations with PowerPoint documents to share the experience of the studies in this subspecialty.

2.2.3 Assessment methods

After the training of the two groups of trainees, the evaluations of theoretical knowledge, practical skills and operational abilities should be conducted, together with the satisfaction questionnaire of the students on the teaching. (1) The evaluations of theoretical knowledge and practical skills included 100 points respectively, and the evaluation of practical skills was conducted according to the SOP of Endoscopy Nursing with the exam items selected randomly. (2) The evaluation of operational abilities was conducted by the evaluation sheets filled by the surgeons after the completion of the training of each student, including the aspects such as: nursing professionalism, preoperative preparation, intraoperative cooperation, intraoperative communication skills, asepsis and no-touch isolation techniques, and emergency responses. Evaluation sheets were designed in unified form, with a total of 30 points, and 5 points for each item: 1=bad; 2=acceptable; 3= good; 4= very good and 5=excellent. (3) After the completion of the training, the students should fill out the teaching satisfaction questionnaire with the following contents: training contents, training methods, training effects, teaching quality and mentor responsibility, and so on. The questionnaire was designed with the full marks of 25 points, and 5 points for each item: 1= dissatisfied; 2=acceptable; 3= satisfied; 4= very satisfied and 5=excellent.

3 Statistical methods

The data were collected and analysed by statistical software SPSS 19.0. Mean \pm standard deviation was used to describe the measurement data with the t-test. The counting data were described by rates and was tested by the χ^2 test, with $P < 0.05$ indicating that the difference was significant.

4 Results

The scores of the evaluations of theoretical knowledge, practical skills and operational abilities were significantly higher in the experimental group than those in the control group ($P < 0.05$), and also the results of teaching satisfaction were also significantly higher than those in the control group ($P < 0.05$), as shown in Table 1.

Table 1. The Compare two groups of nurse training results.

Group	n	Theoretical knowledge Assessment	Operation skills assessment	Business capability assessment	Teaching satisfaction score
Control group	30	85.5 \pm 6.0	89.5 \pm 4.0	21.0 \pm 4.0	18.0 \pm 3.0
Observation group	34	92.8 \pm 5.0	94.6 \pm 5.0	25.0 \pm 3.0	22.0 \pm 3.0
t		5.31	4.47	4.56	5.32
p		$P < 0.05$	$P < 0.05$	$P < 0.05$	$P < 0.05$

5 Discussion

5.1 The significance of specialized training of endoscopy nurses

The specialized operative cooperation is the inevitable trend of development of OR nursing [6], also is in line with the needs of the development of modern surgical techniques. The specialized nursing cooperation for the specialized surgery, can improve the initiative, accuracy and understanding of the OR nurses, so as to improve the quality of operative cooperation and OR nursing. Compared with

other surgeries, endoscopic surgeries have the features of various surgical instruments and devices and fast updates of the techniques, hence putting forward higher requirements of the specialized endoscopy nurses. Therefore, high-level endoscopy nurses with high quality are needed to be trained for the OR nursing. Efficient methods of training have always been an issue of concern of the managers.

5.2 The precise aspects of precision training

Precision training means the precise standards and specifications of all parts of training to for the effective, satisfactory results of the training. (1) In the conventional specialized training, the theoretical training is prior to the practice training, and limited in the classroom, with the knowledge explained and memorized without complete understanding or master. Also, there is no specific system of the theoretical teaching, nor a systematic integration of knowledge, and is just a superposition of single points of knowledge, falling short of good training effects. In the precision training, the training content and schedule are precisely arranged, with contents, purposes and estimated effects of each parts specified clearly. The theoretical training is totally out of the conventional classroom mode, with the introduction of the endoscopic equipment and devices with the real products. The endoscopic equipment and devices are various with complex operations. The conventional training only started the usage, installation, disassembly, cleaning, disinfection and maintenance of the devices and equipment in the period of practical training, while there is only presentation with PowerPoint documents in the theoretical training. In this way, the students cannot fully master the knowledge early in the training, and cannot skilfully use the endoscopic equipment and device in the training of the subspecialties of endoscopic surgeries. As a result, the students pay more attention to the points of the endoscopic equipment and devices, ignoring the operation cooperation and emergency responses or other key skills. Precision training can avoid such problems, by teaching the students the usage of the equipment and devices for full mastery in the beginning of the training, resulting in the corresponding skills in the follow-up stages. In the design of the training contents of precision training, the students first observe the surgical processes, and then listen to the introductions of the systematic knowledge of the subspecialties. Compared with the conventional training, this arrangement can make the students have a preliminary understanding of the surgeries before the theoretical knowledge, knowing the key points for the theoretical knowledge, so as to achieve high efficiency of learning. (2) In the precision training, the precision of the teaching arrangement with the mentors of all subspecialties selected by the specialized group can put the mentors in the subspecialties that they are actually good at, so as for a better teaching effect and the maximum optimization of the teaching resources. Meanwhile, the whole-process mentor responsibility system can help the students develop learning plans, keep up with the students' learning status and results, timely solve the problems of the students encountered in training, and participate in the evaluation of students during the whole process. In the conventional training, the theoretical training is conducted together by the theory teachers, and the practical training is the rotating in the subspecialties with one mentor for one student, and the learning effects are totally controlled by the student oneself, with no one else to be responsible for the whole-process control of the learning effects except the final evaluation. With the whole-process mentor responsibility system, the mentor can always keep up with the students' learning progress, participate in the evaluations with sufficient understanding of the weaknesses of the students and supplemental learning in a timely manner This mode can also create a supervising effect of the learning process, so that students feel the pressure of learning and motivation, so as to mobilize the enthusiasm of the students [1]. (3) The standardization of surgical processes is also an important part of precision training. The precision of operative cooperation can make the specialized OR nursing easier in the operative cooperation, so as to achieve standardization and accuracy. By the establishment of the standard processes of material preparation, patient positioning, operative cooperation, equipment cleaning and disinfection, and emergency responses, the operative cooperation for endoscopic surgeries can become more accurate, detailed, standardized and efficient. (4) Meanwhile, in the precision training, the establishment of the precision of evaluation system, can

combine the mentor assessment and student self-assessment for the studies of each period and each subspecialty. Compared with the final exam in the conventional training, this system can timely find out the weaknesses of the students and make up for them, so as to reach the corresponding level of teaching and learning.

5.3 The effects of precision training

The level of satisfaction is an effective standard to evaluate the teaching quality and effects. In this study, the scores of the teaching satisfaction and physician satisfaction were significantly higher in the experimental group than those in the control group, while the scores of the evaluations were also significantly higher than those in the control group. Causal Analysis: (1) Precision training can make the training structure more scientific, with a clear setting of the learning purposes of the students, so as to improve the initiative and enthusiasm for better learning effects. (2) The precision of the setting of the training mentors can put the mentors in the areas that they are good at, to improve the effect of teaching, the responsibility of the mentors, the interaction between mentors and students and the teaching quality. (3) In the studies in the subspecialties, the students can receive standardized evaluations, timely solutions to the learning problems, comparatively fixed physician-nurse setting and a better degree of teamwork. In conclusion, precision training can greatly improve various abilities of the specialized endoscopy nurses, enhance the teaching quality of specialized training, and have better training effects.

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