Showa Univ J Med Sci **26**(1), 1～7, March 2014

Original

Surgical Skill-up Seminar (Northern Yokohama Skill-up Seminar ; NYSS) Using a Wet-lab Training System for Clinical Residents of Showa University Northern Yokohama Hospital

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Abstract : Suturing is an essential surgical skill for clinical residents. However, acquiring on-the-job training and practice for this skill is becoming difficult due to the growing awareness of patients' rights and safety. Thus, training clinicians get most of their suturing practice on simulators that use artificial compounds such as urethane that generally do not adequately represent 'real-life' tactile sensation. Since 2011, we have therefore conducted an annual surgical skill-up seminar using swine skin, stomach, intestine, and blood vessels for clinical residents of Showa University Northern Yokohama Hospital. This seminar is held on an autumn Saturday afternoon at Terumo Medical Pranex® in Nakai-cho, Ashigarakami-gun, Kanagawa, in collaboration with the Department of Medical Education, Digestive Disease Center and other surgical departments. We have thus far trained 92 participants (52 clinical residents and 40 surgical physicians) in total in the following areas : skin suturing, tracheotomy, laparoscopic cholecystectomy, organ anastomosis (stomach to small intestine), and vascular anastomosis. A post-practice unsigned questionnaire revealed an affirmative self-assessment rating of approximately 95% regarding the seminar contents. Most participants were satisfied with the group setting, but not satisfied with the 3.5-hour training time. Although hosting this wet-lab training seminar using biological models requires a significant budget and manpower, it has successfully provided a valuable learning opportunity on basic surgical skills for clinical residents.

Key words : surgical skill, simulation training, wet-lab, skill-up seminar

Introduction

Basic wound suturing is a surgical essential skill, but on-the-job training in suturing is becoming difficult to offer for clinical residents from the viewpoints of patient rights and medical safety[1]. Therefore, a suture simulator with artificial materials is often used as a substitution for a human body ; however, such a system is not ideal to learn the sense of surgical touch for incisions and suturing because the simulator materials are very different from real human skin and other organs.

A medical education model core curriculum[2] revised in March 2011 listed the following as

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necessary basic surgical skills : 1) clean operation, 2) hand washing, 3) gown technique, 4) basic suturing, 5) sterilization and gauze exfoliation of the wound, and 6) surgical participation and assistance. However, it is reported that medical students who judged surgical skill to be "good" or "fair" at the end of bedside teaching by oneself remains at 70%. In other words, it is thought that approximately 30% of medical students in this situation do not experience sufficient surgical skills, especially in basic suturing, only in bedside teaching[3]. Also, a similar situation is likely for clinical residents at the beginning of the training.

Based on this finding, a surgical skill-up seminar (Northern Yokohama Skill-up Seminar ; NYSS) has been held for clinical residents of Showa University Northern Yokohama Hospital in cooperation with all surgical departments of our hospital since 2011. In this wet-lab training system using swine skin, trachea, stomach, small intestine, and blood vessels, clinical residents acquire a more realistic experience of the clinical setting than is possible with dry-lab simulation models. Herein, I describe the experience of participants in these skill-up seminars over the past 3 years and the impact on future programs.

Methods

Seminar setting

This seminar using swine organs for clinical residents was held once a year since 2011. In this seminar, on a Saturday autumn afternoon at Terumo Medical Pranex® in Nakai-cho, Ashigarakami-gun, Kanagawa, clinical residents took a surgical skill simulation training under the cooperation of the Department of Medical Education, Digestive Disease Center and other surgical departments. The total number of participants was 92 (52 clinical residents and 40 surgical physicians) (Table 1).

In addition, the surgical instruments which we used in these seminars were prepared with cooperation of the Digestive Disease Center and TERUMO®. Also, the swine organs were

Table 1. Participant profiles

		1st	2nd	3rd
		Nov. 2011	Oct. 2012	Nov. 2013
Clinical residents	1st	9	21	20
	2nd	0	2	0
		9	17	14
Instructors (departments)		Digestive Disease Center Respiratory Disease Center Surgery Neuro Surgery Orthopedic Surgery Obstetrics and Gynecology Otorhinolaryngology Children's Medical Center		

Table 2. Schedule of simulation training (Nov 9, 2013)

Time	Activity	
13 : 30-14 : 45	Commute by bus	
14 : 45-15 : 00	Orientation	
15 : 00-15 : 30	Skin suture	
	A group	B group
15 : 30-16 : 15	Tracheotomy	Laparoscopic cholecystectomy
16 : 15-17 : 00	Laparoscopic cholecystectomy	Tracheotomy
17 : 00-17 : 15	Break	
	A group	B group
17 : 15-17 : 55	Organ anastomosis	Vascular anastomosis
17 : 55-18 : 30	Vascular anastomosis	Organ anastomosis
18 : 30-19 : 00	Questionnaire	
19 : 00-20 : 00	Discussion/comments	

Fig. 1. NYSS using wet-lab training system
(upper : skin suture, lower : organ anastomosis)

prepared by TERUMO®.

Seminar contents

As for the seminar contents, clinical residents performed the following : skin suture, tracheotomy, laparoscopic cholecystectomy, organ anastomosis (stomach-small intestine) and vascular anastomosis [Vascular anastomosis was begun in 2013.] (Table 2). For each content, one instructor was grouped with one resident or two (Fig. 1).

Table. 3 Results of questionnaires from the residents

		1st (Nov. 2011) n = 9			2nd (Oct. 2012) n = 21			3rd (Nov. 2013) n = 20		
		good	average	poor	good	average	poor	good	average	poor
Performance of surgical skills	skin suture	9	0	0	20	1	0	19	1	0
	tracheotomy	9	0	0	19	2	0	20	0	0
	laparoscopic cholecystectomy	7	2	0	20	1	0	18	2	0
	organ anastomosis	7	2	0	21	0	0	18	2	0
	vascular anastomosis	–	–	–	–	–	–	18	2	0
Training time	skin suture	1	5	3	1	10	10	0	11	9
	tracheotomy	0	7	2	5	10	6	4	12	4
	laparoscopic cholecystectomy	0	4	5	0	4	17	0	7	13
	organ anastomosis	0	4	5	0	9	12	0	5	15
	vascular anastomosis	–	–	–	–	–	–	0	3	17
Instruction method	skin suture	9	0	0	20	1	0	18	2	0
	tracheotomy	9	0	0	19	2	0	19	1	0
	laparoscopic cholecystectomy	9	0	0	20	1	0	19	1	0
	organ anastomosis	9	0	0	20	1	0	19	1	0
	vascular anastomosis	–	–	–	–	–	–	19	1	0

Post-practice unsigned questionnaires were completed by both residents and instructors in order to evaluate the seminar contents, and the results of the three annual seminars were collected and analyzed.

Results

Residents' response

Regarding the incentive for participation in these seminars of the clinical residents, participation was considered 28% as duty, 14% of advice from attending physicians, and 58% voluntary participation. We showed the results of the questions on subjective assessments using 3-point rating scales about each surgical skill and seminar setting. About 95% of residents demonstrated satisfactory impressions and performed all five surgical techniques with satisfactory skills after wet-lab training. In the seminar setting, the training time was not sufficient, but staff placement and the instruction method were appropriate (Table 3).

Instructors' response

The results of the questions asked by assessments using 3-point rating scales on each surgical skill and a 5-point rating scale on seminar setting are shown in Table 4. There were some variations, because different residents and instructors who were not in charge of some surgical skills joined each seminar. Many instructors evaluated the performance of the residents as "good" based on the medical doctors of the first year, but the training time was considered as not sufficient (Table 4).

Table. 4 Results of questionnaires from instructors

		1st (Nov. 2011) n = 9			2nd (Oct. 2012) n = 10※			3rd (Nov. 2013) n = 14		
		adequate	poor	unknown	adequate	poor	unknown	adequate	poor	unknown
Performance of surgical skills	skin suture	7	0	2	6	3	1	11	2	1
	tracheotomy	6	1	2	5	1	4	9	0	5
	laparoscopic cholecystectomy	7	0	2	5	3	2	11	1	2
	organ anastomosis	8	1	0	9	1	0	9	2	3
	vascular anastomosis	–	–	–	–	–	–	9	2	3
Training time	very good		2			1			5	
	good		5			3			5	
	average		1			3			2	
	poor		1			3			2	
	very poor		0			0			0	

※ Total number of participants was 17, but only 10 doctors could complete the questionnaire.

Discussion

Basic wound suturing is an essential surgical skill, but limited hands-on exposure to surgical skills acquisition in humans is becoming increasingly problematic in medical education. Numerous factors have contributed to this problem, including increasing concern regarding patient safety, a trend toward a decreased length of surgical clerkships, duty hour limitations and so on[4]. On the other hand, the utility of the surgical education system in bedside learning using animal organs has been known for a long time[5]. Bovine tongue, swine skin, sausage, latex gloves and so on have been used for the training of the skin suture. Bovine tongue and swine skin were evaluated as appropriate for the simulation training of skin suture, and simulation seminars have often been undertaken using swine skin because bovine tongue is expensive[6–8]. The excellent point of the swine skin is that the touch-sensation at incision and suture is the nearest to that of human skin. In contrast, the suture simulator consisting of the artificial material (ex. urethane) is available for the training of a great number of students, and it is superior in that 1) repeated usage is possible, 2) there is no risk of infection, and 3) we do not have to worry about smell and putrefaction such as with animal organs. Thus it should be determined whether it is appropriate to use animal organs such as swine skin or artificial material. In these seminars, we used swine organs for skin suture, tracheotomy, organ anastomosis (stomach-small intestine) and vascular anastomosis.

Given this situation, we have organized an annual surgical skill-up seminar using a wet-lab training system since 2011 for clinical residents of Showa University Northern Yokohama Hospital. In these skill-up seminars using swine organs, basic surgical skills could be learned intensively and satisfactorily. Selecting the time of autumn to hold these seminars (i.e. half a year from the April time of the new school year) proved effective in the acquisition and reflection of both surgical knowledge and technique.

The results of questionnaires on the performance of the residents revealed satisfactory impressions of the residents and instructors, but an unsatisfactory impression of the training time. Clinical residents tended to require a longer instruction time for laparoscopy and organ anastomosis, which are advanced surgical skills. On the other hand, instructors thought that the time distribution of this level might be sufficient, if the first step of surgical method acquisition of these simulation seminars was considered. It was speculated that a sufficient number of instructors to teach the residents was important. Actually, in these seminars, one instructor was in charge of one or two residents, and was able to give direct feedback when the resident showed insufficient surgical skills.

These seminars are considered to be very beneficial based on the questionnaire findings, but there are some problems in the holding of these meetings. At first, there is a problem of cost. The swine organs, prepared by TERUMO®, cost approximately 700,000 yen for each seminar. We expend a large amount of money to raise the interest in surgical careers in consideration of the serious decrease of medical students wishing to become the surgeons, but the economic burden is too large to continue these seminars.

Secondly, there is the problem of manpower of seminar organizing. We would not have been able to hold these seminars once a year from 2011 without the cooperation and voluntary participation of the Digestive Disease Center, other surgical departments and the president of our hospital on the night of Saturday. As for the collaboration of the departments overlooking medical education transversely and those with high medical specialty, it is thought that the major motivation power for their activity is to provide a learning opportunity for young medical students. Additionally, these skill-up seminars are an effective method to teach a wide variety of surgical skills while maintaining close interaction between residents and faculties. These factors could positively influence residents' desire for a surgical career[9, 10].

In order to continue these seminars, top-down command by the top of the hospital, i.e., the president of our hospital, an office manager, or the head of a clinical training supervisor is indispensable. Thereby, devices such as a setup of the date (to be held on one day on a Saturday or Sunday) and a participant's duty operating exemption, can be performed. Moreover, holding these seminars regularly is attained by performing budget appropriation for the necessary expenses.

In the future, it will be necessary to investigate what kind of influence these seminars have on clinical residents' courses and we expect that the clinical residents who experienced these surgical skill-up seminars using a wet-lab training system will play an active role not only as surgical specialists but also as medical specialists of the next generation who can treat from primary care minor surgery to emergency trauma. Although the high cost of these seminars and the required manpower can be limiting factors, a surgical skill-up seminar using a wet-lab training system is feasible and should be considered for clinical residents.

There is no conflict of interest to declare for this study.

Acknowledgments

I would like to thank Dr. Susumu Taguchi (President of Showa University Northern Yokohama Hospital), the Digestive Disease Center, and the surgical departments of Showa University Northern Yokohama Hospital, and TERUMO® for planning and cooperation in conducting these skill-up seminars.

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[Received November 18, 2013 : Accepted December 13, 2013]