



# Suture and Knotting Training for Young Doctors: A Prospective Randomized Study

De Werra C, Cardone R\*, Autorino G, Miranda L and Galloro G

Department of Surgery, A.O. Monaldi Hospital Naples, Italy

## Objectives

Training in suturing and knotting is one of the firsts practical challenges young doctors must face. Nowadays, with the technological progress, the alternatives in this domain are more and more innovative and we have tried to propose a low-budget efficient alternative in comparison to the latest VR and digital simulators [1-5]. We have organized this prospective study to evaluate the skills developed by the students who utilized our simulator, trying to integrate the level of practical formation in our university.

## Materials and Methods

The Suture & Knot trainer is a surgical simulator which makes possible to train in executing sutures and knots both in surface and in depth using plastic cylinders of different diameters, also taking into account the strength utilized to knot, thanks to the simulator of tension. Moreover, the knotting station can be removed to hold a suture pad specifically created using a specific silicon mixture, which tried to recreate the cutaneous/subcutaneous rapport (Figures 1-3). Our analysis is based on the data collected between November 2015 and September 2018 during the courses "Materiali e tecniche di sutura ed annodamento" organized at the University "Federico II" of Naples. The participants were 452 selected among senior students in med school, newly graduated doctors, and young specialist trainees. They were divided randomly into 2 groups of 226 (158 students, 55 newly graduated doctors and 13 specialist trainees) participants each. The specialist trainees were all from their first year in different surgical specializations.

Both groups were stratified taking into account their level of instruction (Table 1), thus obtaining two homogenous groups.

Everyone has assisted to one 3 hours long theory lesson and, later on, they've practiced for further 9 hours.

During the practical phase, group A utilized simple devices already present on the market, which didn't have neither simulators of depth nor the simulator of tension, both prominent features of the Suture & Knot trainer simulator; while group B used our device. All the participants have learned the following skills: Simple knot, surgical knot, one-handed knot, simple stitches, McMillan-Donati stitches, continuous suture and intradermal continuous suture.

Both groups attended the same theoretical lesson, followed by practical lessons with a standardized program, established beforehand by general surgery professors in our university.

The different skills, possessed and developed by the apprentices, were evaluated by 3 different surgeons, all professors at the university, employing the following parameters represented by a continuous line from zero to five points: grade of tension on the wound, symmetry in bite, symmetry in gap and juxtaposition of the margins; time of execution was also measured and compared. The assessment has been performed at the beginning (T0) and at the end (T1) of the practical lessons. Statistical analysis was performed using t-Student test with a significance level  $\alpha=0.05$ : the differences between the two groups were statistically significant in each item we explored during the study.

## Results

The scores of the two groups were similar at the beginning (A:5.7 pts vs. B:5.5 pts) (Image 1): group B has showed more growth in speed both in knotting(average time A:6 sec vs. B:3.9 sec) and in sutures(average time A:6.2 min vs. B:4.3 min) (Image 2); moreover it has shown higher quality results at T1 (A:11.8 pts vs. B:16.5 pts) (Image 1). Also, group B showed better results in each and every quality item analyzed (Image 3). The confrontation between the results at T0 and T1 has

## OPEN ACCESS

### \*Correspondence:

Cardone R, Department of Surgery,  
Monaldi Hospital Naples, Italy,  
E-mail: rob.card2011@libero.it

Received Date: 10 Dec 2018

Accepted Date: 20 Dec 2018

Published Date: 24 Dec 2018

### Citation:

De Werra C, Cardone R, Autorino G, Miranda L, Galloro G. Suture and Knotting Training for Young Doctors: A Prospective Randomized Study. Clin Surg. 2018; 3: 2271.

Copyright © 2018 Cardone R. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

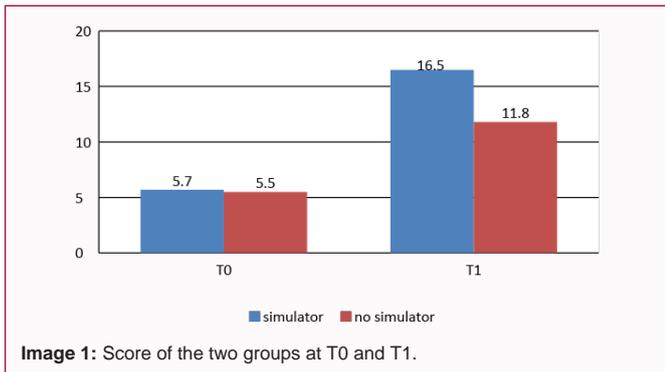


Image 1: Score of the two groups at T0 and T1.

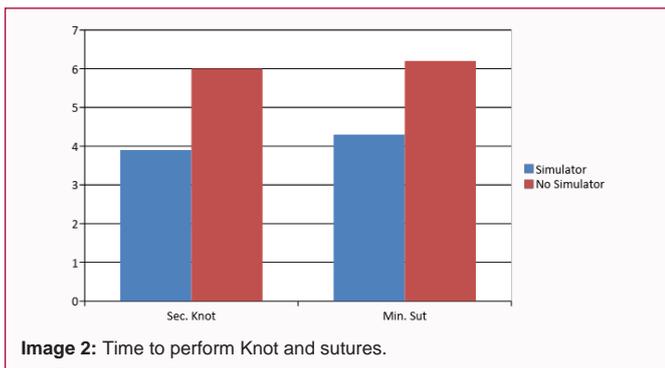


Image 2: Time to perform Knot and sutures.

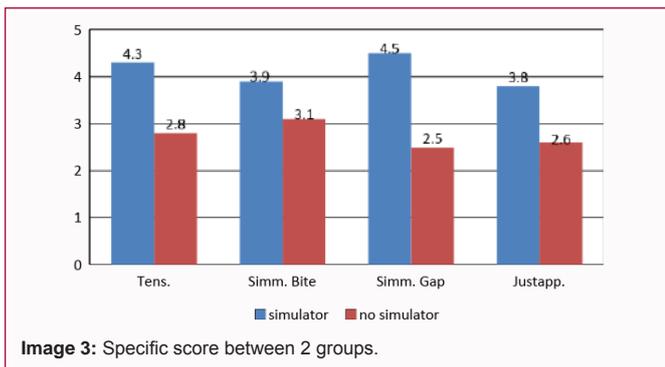


Image 3: Specific score between 2 groups.

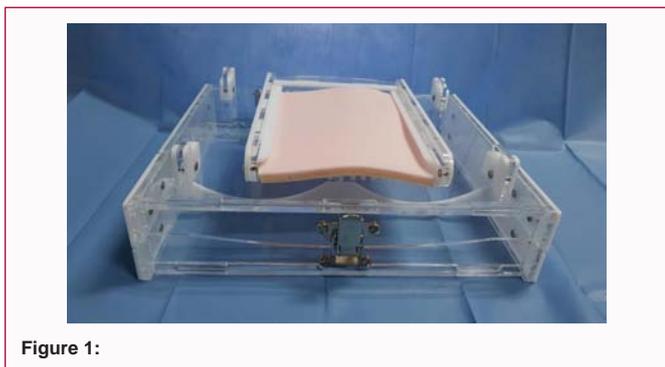


Figure 1:

demonstrated a greater development for group B (score T1 - score T0=11 pts for group B vs. 6.1 pts for group A), without significant differences among students, doctors and specialist trainees.

**Conclusion**

The utilization of the Suture & Knot trainer guarantees better results in learning the basic suturing and knotting skills, independently from the basic level of knowledge and skills. This device is thus an



Figure 2:

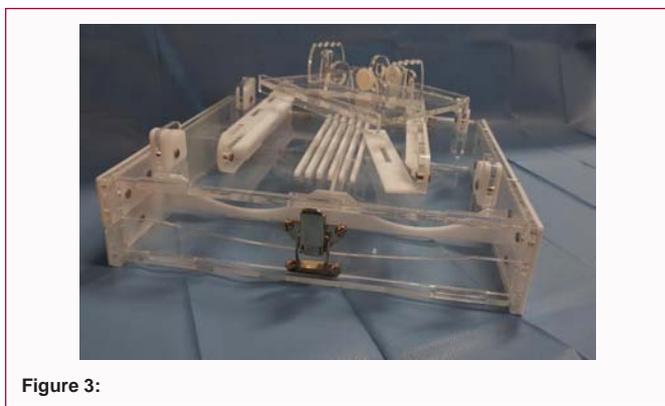


Figure 3:

Table 1: Composition of the 2 groups.

	Group A	Group B
Average Age	23 (21-27)	22 (20-28)
Students	79	79
Newly graduated doctors	28	27
Specialist trainees	6	7

helpful instrument in the young doctors' formation, giving them the chance to acquire the necessary skills of the basic surgery. It should also be noted that dedicated courses for senior students should be organized during med school [5-16]. It is because of these promising results that we're already working on a Suture & Knot trainer 2.0, with new telescopic cylinders and an electromagnetic tension simulator.

**References**

- Mittal V, Salem M, Tyburski J, Brocato J, Lloyd L, Silva Y, et al. Residents' working hours in a consortium-wide surgical education program. *Am Surg.* 2004;70(2):127-31.
- Reznick RK, Folse JR. Effect of sleep deprivation on the performance of surgical residents. *Am J Surg.* 1987;154(5):520-5.
- Saied N. Virtual reality and medicine. From the cockpit to the operating room: are we there yet? *Mo Med.* 2005;102(5):450-5.
- Brewster LP, Risucci DA, Joehl RJ, Littooy FN, Tembeck BK, Blair PG, et al. Management of adverse surgical events: a structured education module for residents. *Am J Surg.* 2005;190(5):687-90.
- Mitton C, Donaldson C, Shellian B. Priority setting in a Canadian surgical

- department: a case study using program budgeting and marginal analysis. *Can J Surg.* 2003;46(1):23-9.
6. Bridges M, Diamond DL. The financial impact of teaching surgical residents in the operating room. *Am J Surg.* 1999;177(1):28-32.
  7. Hamstra SJ, Dubrowski A. Effective training and assessment of surgical skills, and the correlates of performance. *Surg Innov.* 2005;12(1):71-7.
  8. Grober ED, Hamstra SJ, Wanzel KR, Reznick RK, Matsumoto ED, Sidhu RS, et al. The educational impact of bench model fidelity on the acquisition of technical skill: the use of clinically relevant outcome measures. *Ann Surg.* 2004;240(2):374-381.
  9. Datta VK, Mackay SD, Mandalia M. The comparison between motion analysis and surgical technical assessments. *Am J Surg.* 2002.
  10. Martin JA, Regehr G, Reznick R, MacRae H, Murnaghan J, Hutchison C, et al. Objective structured assessment of technical skill (OSATS) for surgical residents. *Br J Surg.* 1997;84(2):273-8.
  11. Seymour NE, Gallagher AG, Roman SA, O'Brien MK, Bansal VK, Andersen DK, et al. Virtual reality training improves operating room performance: results of a randomized, double-blinded study. *Ann Surg.* 2002;236(4):458-63.
  12. Grantcharov TP, Kristiansen VB, Bendix J, Bardram L, Rosenberg J, Funch-Jensen P. Randomized clinical trial of virtual reality simulation for laparoscopic skills training. *Br J Surg.* 2004;91(2):146-50.
  13. Anastakis DJ, Wanzel KR, Brown MH, McIlroy JH, Hamstra SJ, Ali J, et al. Evaluating the effectiveness of a 2-year curriculum in a surgical skills center. *Am J Surg.* 2003;185(4):378-85.
  14. Lee TD, Genovese ED. Distribution of practice in motor skill acquisition: learning and performance effects reconsidered. *Res Q Exerc Sport.* 1988;59(4):277-87.
  15. Schmidt RA, Bjork RA. New conceptualization of practice. *Psych Sci.* 1992;3:207-17.
  16. Donovan JJ, Radosevich DJ. A meta-analytic review of the distribution of practice effect: now you see it, now you don't. *J Appl Psychol.* 1999;84(5):795-805.