A Novel Interdisciplinary Educational Model for Traumatic Laceration Repair in Surgical Training Programs

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Background

Laceration repair is a critical component of general surgery. Most general surgery residency programs allocate minimal time for in-depth laceration repair training. We present a collaborative and practical solution that allows for general surgery postgraduate year-one (PGY-1) residents to receive laceration repair training by plastic surgery senior residents, through a single formal educational session and with additional education integrated into routine workflow.

Methods

- Study participants included PGY-1 residents from the general surgery training program at our institution.
- The control group (2018-2019 PGY-1's) did not receive laceration repair training beyond standard general surgery curriculum and clinical experience.
- The experimental group (2019-2020 PGY-1's) underwent a single two-hour didactic session held by senior plastic surgery residents. In addition, all clinical laceration repairs that required consultation of the plastic surgery service over the course of the academic year were performed by the general surgery PGY-1 resident under the guidance of the plastic surgery senior resident.
- Both groups completed a confidence survey, basic knowledge test, and practical examination at the completion of their PGY-1 academic year, results of which were compared.
- The experimental group also completed the same evaluations at the start of the academic year, results of which were compared to end-of-year results.

Example of fresh cadaver arm with laceration for practical exam.

Results

Study Participants

- Control: 7 general surgery residents
- Experimental: 16 general surgery residents
- Both groups with mixed completion rates

Outcomes

1. The experimental group performed significantly better on the end-of-year practical exam compared to the control group, (20.7 vs. 12.0, p<0.005) and (29.7 vs. 24.9 p<0.05), and as compared to its start-of-year results (20.7 vs. 15.3, p<0.005) and (29.7 vs 18.6, p<0.005).

Results of practical exam, comparison between Group 1 and Group 2

Task	Maximum possible score	Group 1 EOY[1] Mean score (±SD)	Group 2 EOY[1] Mean score (±SD)	p-value
Checklist				
Local Anesthetic	3	2.1 (.7)	2.3 (.5)	
Wound Washout	2	0.9 (.4)	0.9 (.5)	
Asepsis and Skin Prep	4	3.0 (.8)	3.8 (.4)	
Tissue Handling	3	1.3 (.8)	2.4 (.8)	
Suturing	11	6.1 (2.3)	10.6 (.8)	
Maximum Checklist Score	23	12.0 (3.4)	20.7 (1.8)	p= .00021
Global Scale of Operative Performance				
Administering local anesthetic	5	3.7 (.8)	4.3 (.8)	
Maintaining a sterile field	5	4.3 (.8)	4.3 (.9)	
Instrument handling	5	4.0 (.8)	4.3 (.8)	
Tissue handling	5	3.1 (.4)	4.4 (.8)	
Quality of wound washout	5	2.9 (.7)	3.6 (.9)	
Quality of Suturing	5	3.4 (.5)	4.4 (.8)	
Motion and Flow	5	3.4 (.5)	4.4 (.8)	
Maximum GSOP* Score	35	24.9 (2.9)	29.7 (4.0)	p= .025

[1]EOY: End of year, [2]GSOP: Global scale of operative performance

Results of practical exam, comparison between pre- and post-intervention Group 2

Task	Maximum possible score	Group 2 BOY[1] Mean score (±SD)	Group 2 EOY[2] Mean score (±SD)	p-value
Checklist				
Local Anesthetic	3	2.1 (.9)	2.3 (.5)	
Wound Washout	2	1.4 (.5)	0.9 (.5)	
Asepsis and Skin Prep	4	2.6 (1.1)	3.8 (.4)	
Tissue Handling	3	1.4 (.8)	2.4 (.8)	
Suturing	11	7.7 (2.1)	10.6 (.8)	
Maximum Checklist Score	23	15.3 (2.6)	20.7 (1.8)	p =0.0008
Global Scale of Operative Performance				
Administering local anesthetic	5	2.6 (.5)	4.3 (.8)	
Maintaining a sterile field	5	3.1 (.7)	4.3 (.9)	
Instrument handling	5	2.6 (1.1)	4.3 (.8)	
Tissue handling	5	2.1 (.7)	4.4 (.8)	
Quality of wound washout	5	2.6 (.8)	3.6 (.9)	
Quality of Suturing	5	2.9 (.9)	4.4 (.8)	
Motion and Flow	5	2.7 (.9)	4.4 (.8)	
Maximum GSOP[3] Score	35	18.6 (2.8)	29.7 (4.0)	p =0.00009

[1]BOY: Beginning of year, [2]EOY: End of year, [3]GSOP: Global scale of operative performance

2. Confidence and basic knowledge were also improved over the control group and over the start-of-year results, though without statistical significance.

Results of test of basic knowledge

	Mean Total score (±SD)
Group 1 EOY[1]	51.4% (9.0)
Group 2 BOY[2]	44.4% (16.7)
Group 2 EOY[1]	54.4% (17.4)

[1]EOY: End of year, [2]BOY: Beginning of year,

Results of confidence survey

Survey Statement	"I am comfortable with mixing, dosing and administering local anesthetic for the treatment of traumatic lacerations."	"I feel confident with my ability to properly irrigate a contaminated wound."	"I am comfortable completing a sterile procedure at bedside while maintaining a sterile field."	"I am confident in my ability to assess a traumatic laceration/soft tissue injury and formulate an appropriate treatment plan."	"I am confident in my ability to select appropriate suture materials for various types and locations of soft tissue injury repair."	"I feel comfortable handling soft tissue including identifying tissue planes, undermining adequately and manipulating skin edges."	"I feel confident in my ability to perform suturing techniques including knot tying, instrument handling, and eversion of skin edges."
Group 1 EOY[1] Mean Likert* score (SD) n = 7	3.4 (0.9)	4.0 (0.5)	4.3 (0.5)	3.5 (0.5)	3.5 (0.8)	4.1 (1.0)	4.7 (0.5)
Group 2 SOY[2] Mean Likert* score (SD) n = 15	2.5 (1.1)	3.6 (1.1)	3.8 (0.8)	2.3 (1.1)	2.1 (1.2)	2.3 (1.4)	3.4 (0.9)
Group 2 EOY[3] Mean Likert* score (SD) n = 10	4.0 (1.0)	4.4 (0.5)	4.6 (0.5)	3.6 (0.7)	3.4 (0.9)	3.3 (0.9)	4.1 (0.8)

[1]EOY: End of year, [2]SOY: Start of year, [3]Likert scale: 1—strongly disagree, 2—disagree, 3—undecided, 4—agree, and 5—strongly agree

Conclusions

General surgery PGY-1 residents demonstrated an improvement in practical laceration repair following this simple intervention. The intervention is collaborative, simple to implement without a significant resource burden, and compatible with routine workflow. This educational modality can serve as a valuable adjunct to routine general surgery training in laceration repair.