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Title	The Royal College of Surgeons of England Damage Control Orthopaedic Trauma Skills course (DCOTS): resuscitative knowledge and confidence in surgical skills are reliably maintained at six months post course
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Publication date	2023-06-30
Original Citation	Parker, P., Bodger, O. and Pallister, I. (2023) 'The Royal College of Surgeons of England Damage Control Orthopaedic Trauma Skills course (DCOTS): resuscitative knowledge and confidence in surgical skills are reliably maintained at six months post course', Annals of The Royal College of Surgeons of England, 105(6), pp.548-553. doi: 10.1308/rcsann.2023.0030
Type of publication	Article (peer-reviewed)
Link to publisher's version	10.1308/rcsann.2023.0030
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Download date	2026-10-18 00:55:06
Item downloaded from	https://hdl.handle.net/10468/14789

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The RCSEng Damage Control Orthopaedic Trauma Skills Course (DCOTS) - Resuscitative Knowledge and Life-Saving Surgical Skills are Reliably Maintained at Six Months Post-Course

Introduction

Since its introduction in 2012, the 17 courses of the Damage Control Orthopaedic Trauma Skills course have trained over 250 surgeons in the principles and practice of Damage Control Orthopaedics (DCO) and Early Appropriate Care (EAC). These courses, held under the auspices of the Royal College of Surgeons of England (RCSEng), took place initially at the College in London and more recently at the RCSEng Partner cadaver lab at Brighton and Sussex Medical School. With trauma being a leading cause of morbidity and mortality in the UK, the course has tried to pass on lessons of war and conflict from its military faculty and hard-won lessons of 'developed-world' trauma from its experienced civilian faculty.

Each course lasts two days and its content is described in greater detail below (Table 1 - Course Program). The course has always benefitted greatly from the input of the college's in-house education faculty. Whilst the clinical faculty had generally held the belief that what it was teaching was; primarily well taught and secondarily adequately retained, we were challenged by the educationalists to prove that belief. To that end we conducted a perceived competence survey before and after the course; and also we felt most importantly, six months after the course ended. The topics were what we perceived were the three more important elements of the course. Damage Control Resuscitation (DCR) with Damage Control Surgery (DCS), Pelvic External Fixation, and Pelvic Packing.

Method

Participating surgeons were invited to score their self-reported confidence prior to attending the DCOTS Course, immediately at its conclusion and then again, 6 months later. A modified Likert scale was used, with responses made on a 4-point scale from 1=No Confidence to 4=Very

Confident. This data was collected voluntarily from participants via an on-line form.

Simple descriptive analysis was used to categorise the responses and comparisons between time points were made using non-parametric tests. The data for 3 the key facets of participants 'responses was examined. First, the application of Damage Control Resuscitation and Surgery (DCR/DCS) principles, as this is the prime goal of the Course. Second, pelvic external fixation, given familiarity with the equipment required, this was anticipated to be an area in which the participants might be expected to feel confident at the outset. Finally, the responses for pelvic packing for haemorrhage control are presented, as this is widely felt to be an area of great uncertainty in the Orthopaedic General on-call community.

Results

Because of the iterative nature of the course, the number of responses obtained at each time-point is different. Pre-course responses totalled 53, immediate post-course responses 58 and responses at 6 months numbered 26.

Summary: Table 2

Question	Pre-training	Post-training	6m follow up
	Mean (SD)	Mean (SD)	Mean (SD)
DCR/DCS	2.45 (0.64)	3.52 (0.54)	3.58 (0.50)
Pelvic Ex Fx	2.19 (0.94)	3.45 (0.63)	3.15 (0.67)
Pelvic Packing	1.71 (0.87)	3.22 (0.62)	2.77 (0.71)

Question	Pre-training	Post-training	6m follow up
	% confident	% confident	% confident
DCR/DCS	49%	98%	100%
Pelvic Ex Fx	40%	93%	85%

Pelvic Packing	19%	90%	62%

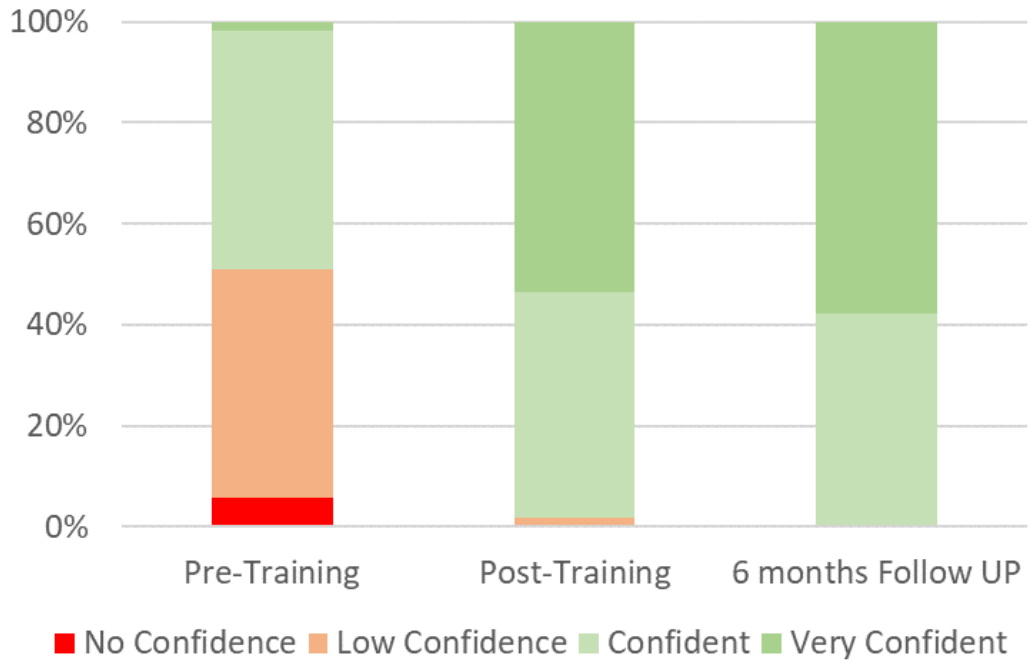
Statistical Testing (Mann-Whitney)

Effect Sizes (Standardised Z statistic)

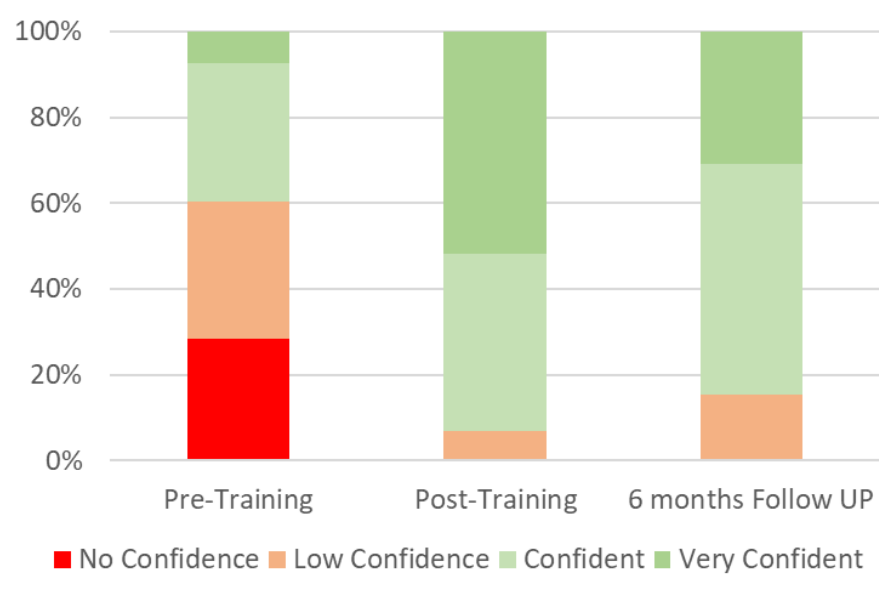
Question	Post vs Pre	6m vs Pre	6m vs Post
DCR/DCS	0.68, large	0.57, large	0.04, small
Pelvic Ex Fx	0.62, large	0.39, medium	0.18, small
Pelvic Packing	0.71, large	0.45, medium	0.27, small

Visual Display of Changes

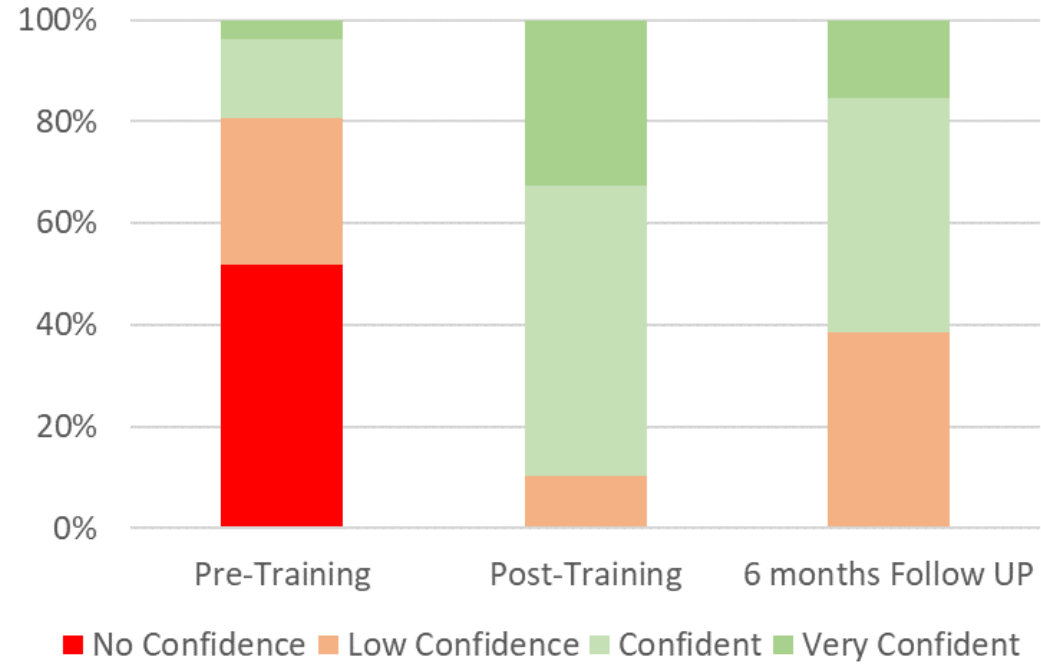
DCR/DCS



Pelvic Ex Fix



Pelvic Packing



Correlations (Spearman's Correlation)

Between measures (across all time points)

	Pelvic Packing	DCR/DCS
Pelvic Ex Fx	0.629**, strong	0.575**, moderate
Pelvic Packing	-	0.639**, strong

Discussion

Damage Control Resuscitation (DCR) principles with Damage Control Surgery (DCS) showed the greatest affirmed knowledge retention rate at six months - 100% which is of course extremely satisfying. Pelvic External Fixation; initially 93%, dropped to 85% also considered good to excellent. Pelvic Packing was 90% at the end of the course but had dropped to a level that although up from its low 19% pre-course, was considered good at 62%, but low for the high standards of the course. This may relate to the low familiarity of UK trainees with the concept and the fact that it is not performed often. A 2010 survey of 232 UK Orthopaedic Trainees revealed that over 2/3 of trainees surveyed had no confidence in their ability to pack a pelvis and 60% had never even seen a case (1). In more complicated cases of spanning external fixation for a 'floating knee', trainees also reported a decreased level of perceived confidence and limited exposure to the technique.

Skills do fade with time. Thirty-eight (95%) of 40 surgical residents and 10 'expert' traumatologists who were evaluated before and within 4 weeks of ASSET (Advanced Surgical Skills for Exposure in Trauma) training completed follow-up evaluations 12 to 18 months later (2). Performance was measured during extremity vascular exposures and lower extremity fasciotomy in fresh cadavers before and after taking the course. Interval experience, rather than time since training, affected skill retention: Only 4 experts and 16 residents (40%) adequately decompressed and confirmed entry into all 4 lower extremity compartments 18 months later.

Norwegian geography has led to several initiatives to train surgical staff from their rural hospitals in damage control surgery using a team-oriented

approach. Their courses run on interactive lecture modules and operative sessions on live porcine models that emphasize communication, collaboration and team-based problem solving. Surveying 38 teams from 21 hospitals over 10 courses showed a mean increase of 2.3 points in proficiency with extra-peritoneal pelvic packing and 1.5 points with emergency thoracotomy on a 5-step Likert scale. This team approach was perceived as crucial by 218 (94%) of participants. A phone survey revealed 12 cases of lifesaving rural damage control operations by course participants in the past 3 years (estimated cost: $15,075 per life saved). Of the 18 hospitals surveyed, 17 had also modified their trauma protocols as a result of the course (3).

Cadaver training improves all the time and perfused fresh frozen (unembalmed) cadavers are seen as a very positive step. Preliminary data highlight its utility for open vascular, thoracic, and other high-acuity/low-volume procedures relevant to combat casualty care. Further work is needed for model optimization and validation of an objective structured technical assessment tool as the current courses only measure skill retention at course end and not at a later period (4). Highly responsive to feedback, we have altered our DCOTS course almost every year since its introduction. In 2020 we added rib-plating, resuscitative thoracotomy and more extensive junctional haemorrhage control to the program.

Educationally we also now very clearly understand that pre-course learning can cause significant anxiety! We are aware of one cadaver course where, if one were to watch all the pre-course videos, it would take 3-4 days without sleep or comfort breaks. The recommended (and supplied) pre-course for DCOTS is currently just one short podcast (CRM), one 10 slide presentation (‘A good save’) and three 5-7 minute videos (the Hoffmann 3 external fixation system, femoral artery control in the groin, and spanning knee external fixation). We have also combined this with a novel course manual sent as a PDF well before the course begins and supplied as a bound paper copy on day 1 of the course (Fig 1. Pic of manual). Again this is on sound educational advice.

Conclusion

In this short report, we have demonstrably shown that three of the main skills taught on DCOTS are effectively retained at 6 months post course. We believe that an experienced and approachable faculty; teaching in an immersive adult learning environment, with 4 short didactic lectures and 9 intense practical sessions delivers a reproducible, entertaining and highly valuable course.

1. Eardley WG, Taylor DM, Parker PJ. Training in the practical application of damage control and early total care operative philosophy--perceptions of UK orthopaedic specialist trainees. Ann R Coll Surg Engl. 2010 Mar;92(2):154-8. doi: 10.1308/003588410X12518836440045. Epub 2009 Dec 7. PMID: 19995485; PMCID: PMC3025224.
2. Hansen KS, Uggen PE, Brattebø G, Wisborg T. Team-oriented training for damage control surgery in rural trauma: a new paradigm. J Trauma. 2008 Apr;64(4):949-53; discussion 953-4. doi: 10.1097/TA.0b013e31816a243c. PMID: 18404061.
3. Mackenzie CF, Garofalo E, Puche A, Chen H, Pugh K, Shackelford S, Tisherman S, Henry S, Bowyer MW; Retention and Assessment of Surgical Performance (RASP) Group of Investigators. Performance of Vascular Exposure and Fasciotomy Among Surgical Residents Before and After Training Compared With Experts. JAMA Surg. 2017 Jun 1;152(6):581-588. doi: 10.1001/jamasurg.2017.0092. PMID: 28249090; PMCID: PMC5540053.
4. Grabo D, Polk T, Minneti M, Inaba K, Demetriades D. Brief report on combat trauma surgical training using a perfused cadaver model. J Trauma Acute Care Surg. 2020 Aug;89(2S Suppl 2):S175-S179. doi: 10.1097/TA.0000000000002737. PMID: 32301887.