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## Integrating technical and non-technical skills coaching in an acute trauma surgery team training: Is it too much?

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### ABSTRACT

**Objective:** Research on effective integration of technical and non-technical skills in surgery team training is sparse. In a previous study we found that surgical teachers predominantly coached on technical and hardly on non-technical skills during the Definitive Surgical and Anesthetic Trauma Care (DSATC) integrated acute trauma surgery team training. This study aims to investigate whether the priming of teachers could increase the amount of non-technical skills coaching during such a training.

**Design:** Coaching activities of 12 surgical teachers were recorded on audio and video. Six teachers were primed on non-technical skills coaching prior to the training. Six others received no priming and served as controls. Blind observers reviewed the recordings of 2 training scenario's and scored whether the observed behaviors were directed on technical or non-technical skills. We compared the frequency of the non-technical skills coaching between the primed and the non-primed teachers and analyzed for differences according to the trainees' level of experience.

**Setting:** Surgical teachers coached trainees during the highly realistic DSATC integrated acute trauma surgery team training. Trainees performed damage control surgery in operating teams on anesthetized porcine models during 6 training scenario's.

**Participants:** Twelve experienced surgical teachers participated in this study.

**Results:** Coaching on non-technical skills was limited to about 5%. The primed teachers did not coach more often on non-technical skills than the non-primed teachers. We found no differences in the frequency of non-technical skills coaching based on the trainees' level of experience.

**Conclusion:** Priming experienced surgical teachers does not increase the coaching on non-technical skills. The current DSATC acute trauma surgery team training seems too complex for integrating training on technical and non-technical skills.

**Competencies:** Patient care, Practice based learning and improvement.

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## 1. Introduction

Shortcomings in non-technical skills are important contributors to errors and adverse events in the operating room.<sup>1–6</sup> Training improves non-technical skills in the operating room and reduces errors,<sup>6–8</sup> patient morbidity<sup>9</sup> and mortality.<sup>10</sup> As a result, non-technical skills training is becoming an essential part of surgical training.<sup>7</sup>

Training can be specifically designed for non-technical skills development.<sup>6</sup> Although effective, other researchers promote integrated skills training in which technical skills and non-technical skills are trained concurrently<sup>11–15</sup> in order to enhance the transfer of non-technical skills to the operating room.<sup>14,16</sup> However, our group found that integrating technical and non-technical skills in surgical training resulted in a strong focus on technical skills.<sup>17,18</sup> There is sparse evidence for the integration of technical and non-technical skills training in surgical specialties<sup>11,12,15</sup> which makes it difficult to design effective and evidence based integrated skills training courses.

At our academic institute we annually offer an integrated acute trauma surgery team training which is part of the national

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Definitive Surgical and Anesthetic Trauma Care (DSATC) course. In this highly complex training setting we found that the coaching on non-technical skills was not in proportion to the coaching on technical skills.<sup>17,18</sup> To gain more insight in the possibilities to increase the amount and quality of non-technical skills teaching next to technical skills teaching, we investigated whether the priming of surgical teachers could increase the amount of non-technical skills coaching. We expect a priming effect in which behavior (in this case non-technical skills coaching) can be evoked, even unconsciously, due to previously offered cues.<sup>19</sup> Theoretical knowledge of non-technical skills and a group discussion on how to coach non-technical skills were the core activities of this priming as research showed that surgical teachers perceive this as useful.<sup>20</sup> In this comparative study we hypothesized that primed teachers would coach more frequently on non-technical skills than non-primed teachers.

## 2. Methods

### 2.1. Participants

We analyzed the coaching of 12 experienced trauma surgeons with 2–32 years of teaching experience who taught in previous DSATC courses. All completed the Advanced Trauma Life Support (ATLS) student course on technical and non-technical aspects of treating critically injured patients, and the ATLS instructor training on teaching in emergency simulation. Twenty-four surgical trainees participated: 8 final year residents (6 year program), 8 junior surgeons (0–5 years of experience) and 8 senior surgeons (6–25 years of experience). Participation is voluntary for general and resident surgeons. Trauma surgeons are required to participate every 4 years.<sup>21</sup> Twelve teams were composed, each containing 1 surgical teacher, 2 surgical trainees, 1 experienced scrub nurse, 1 experienced anesthesiologist teacher and 1 or 2 anesthesia trainees. Participants worked in different hospitals all over the country and were unlikely to have previously collaborated. Surgical trainees were allocated into teams according to the alphabetical order of their surname. Only the surgical teachers were subject to this study. Voluntary written informed consents were collected.

The local review board waived the need for formal ethical approval.

### 2.2. Course description

The DSATC course is a three-day damage control surgery course, combining the original Definitive Surgical Trauma Care (DSTC)<sup>22</sup> and the Definitive Anesthetic Trauma Care (DATC) course.<sup>23</sup> Each day starts with 3.5 h of lectures followed by a 3.5-h workshop. All teachers and trainees attend the lectures on day 1, 2 and 3. All lectures are about technical skills, except for one 30-min lecture on non-technical skills on day 1. Every day, 4 teachers (12 individuals in 3 days) and 8 trainees (24 in 3 days) participate in the 3.5-h integrated acute trauma surgery team training on anesthetized porcine models in 4 operating rooms at the animal facility. This workshop is the focus of our study. Each teacher coaches 2 surgical trainees through 6 scenarios, each containing one or two complex, life-threatening abdominal or thoracic injuries which are not common practice. Trainees are blinded for the injuries inflicted by the teachers. The primary aims are to teach surgical technical skills (damage control techniques) and multidisciplinary non-technical communication and team skills in a team setting.<sup>21,23</sup> The DSATC training is approved by the animal ethical review board.

### 2.3. Intervention and control group

The surgical teachers were assigned to an intervention (N = 6) and control group (N = 6). The intervention group coached trainees on day 1 (N = 4) and 2 (N = 2), the control group on day 2 (N = 2) and 3 (N = 4). Both groups attended the general program containing the 30-min lecture and a spoken reminder (Table 1). In addition, the intervention group participated in a 20-min priming provided by one educationalist/MD and one educationalist, both specialized in medical and surgical teaching (AA and CF) (Table 2). The purpose was to define non-ambiguous definitions and examples of communication and team skills (e.g. *timely inform the anesthetist about bleedings*) since a similar intervention was considered helpful in non-technical skills teaching.<sup>20</sup> Opportunities for teaching during the training were explicitly discussed. A 20-min priming was deemed sufficient because we expected a priming

**Table 1**  
Activities of the intervention and control group.

Timeline	Event	Intervention group	Control group
Evening before the start of the DSATC course	Additional meeting	20-min priming on non-technical skills coaching by 2 educationalists (Table 2)	No intervention
Day 1 of the DSATC course	General program: 3.5 h of lectures	30-min lecture on aviation style communication and team skills; provided by an air craft pilot instructor	30-min lecture on aviation style communication and team skills; provided by an air craft pilot instructor
Day 1–3 of the DSATC course	General program: briefing right before starting the integrated acute trauma surgery team training	Spoken reminder to pay sufficient attention to teaching team and communication skills; provided by the local course organizer	Spoken reminder to pay sufficient attention to teaching team and communication skills; provided by the local course organizer

**Table 2**  
Content of the priming provided to the intervention group.

Part	Focus	Time
1	Last year's research to coaching during the DSATC	5 min
2	a Presenting our findings which showed a predominant attention on technical skills teaching (93%) in comparison with the teaching of communication (6%) and team cooperation skills (1%).	5 min
	b Discussing our findings with the teachers of the intervention group.	
3	a Presenting the evidence-based importance of non-technical skills in the OR.	10 min
	b Presenting definitions of communication and team cooperation skills and provide exemplar behaviors.	
3	a Presenting a tips-and-tricks summary on how to recognize and create moments for non-technical skills teaching and increase the attention for non-technical skills during training.	10 min
	b Group discussion on how teachers think they can increase the coaching on non-technical skills and improve the feedback and instruction on non-technical skills during the training.	

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