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Trauma Care Training for National Police Nurses in Colombia

Andrés M. Rubiano, MD, Álvaro I. Sánchez, MD, Francis Guyette, MD, and Juan C. Puyana, MD

Department of Surgery (AMR, AIS), Division of Trauma and Critical Care (JCP), and the Department of Emergency Medicine (FG), University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania; and MEDTAC (AMR), Bogotá, Colombia.

Abstract

Introduction—In response to a requirement for advanced trauma care nurses to provide combat tactical medical support, the antinarcotics arm of the Colombian National Police (CNP) requested the Colombian National Prehospital Care Association to develop a Combat Tactical Medicine Course (MEDTAC course).

Objective—To evaluate the effectiveness of this course in imparting knowledge and skills to the students.

Methods—We trained 374 combat nurses using the novel MEDTAC course. We evaluated students using pre- and postcourse performance with a 45-question examination. Field simulations and live tissue exercises were evaluated by instructors using a Likert scale with possible choices of 1 to 4. Interval estimation of proportions was calculated with a 95% confidence interval (95% CI). Differences in didactic test scores were assessed using a t-test at 0.05 level of statistical significance.

Results—Between March 2006 and July 2007, 374 combat nursing students of the CNP were trained. The difference between examination scores before and after the didactic part of the course was statistically significant ($p < 0.01$). After the practical session of the course, all participants (100%) demonstrated competency on final evaluation.

Conclusions—The MEDTAC course is an effective option improving the knowledge and skills of combat nurses serving in the CNP. MEDTAC represents a customized approach for military trauma care training in Colombia. This course is an example of specialized training available for groups that operate in austere environments with limited resources.

Keywords

tactical medicine; education; trauma; international medicine; combat medicine; Colombia

Introduction

Violence in Colombia is a multifactorial problem heavily influenced by a protracted armed conflict among the drug enforcement forces of the government, left-wing guerrillas, and drug producers and dealers. This conflict has resulted in a human security crisis of extraordinary dimensions. The full impact of firearm violence on Colombia's society and

Address correspondence and reprint requests to: Andres M. Rubiano, MD, University of Pittsburgh, Department of Surgery, UPMC Presbyterian, 200 Lothrop Street, Floor 13, Room F-1368, Pittsburgh, PA 15213. rubianoam@upmc.edu.

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economy is difficult to quantify accurately. Young men are disproportionately affected by a wide margin, so the impact on both formal and informal productivity is extensive.¹⁻²

During the mid-1980s, the government of the United States provided increased levels of support for law enforcement and economic assistance for Colombia, Peru, and Bolivia with the promulgation of a U.S. National Security Directive "International Counternarcotics Strategy." It was announced that U.S. aid would be dispatched to Colombia to advise and assist Colombian security forces in counternarcotics techniques.³ This antinarcotic operations assistance had been earmarked for the Colombian National Police (CNP).

Units of the CNP, including the Anti-Narcotics section and the Mobile Carabinier Squadrons (EMCAR) (special rural police force that carries out counterinsurgency missions), have been the most directly involved agencies in the war against drug trafficking in Colombia so far. Members of these units within CNP are called Rural Operations Commands (COR) and Jungle Commands (Junglas). They are charged with the difficult mission of confronting and controlling the subversive and criminal groups that are heavily involved in the illicit drug business in Latin America. These groups are involved in high-risk missions and are frequently exposed to combat operations. Colombian counterdrug operations in many respects resemble common combat operations. Rifle incidents tend to produce more deaths than wounded, whereas explosive incidents tend to generate the opposite trend. There have been nearly 39,000 violent deaths due to armed conflict since 1988.⁴ The yearly average is 2,221 violent deaths, many of them concentrated in rural areas. Some of these victims, including members of the CNP, are unable to obtain appropriate trauma care in these hostile environments.⁴ In response to a requirement for the development of advanced trauma care in the field of the rural antinarcotics operations, the Colombian National Prehospital Care Association (ACAPH) developed a Combat Tactical Medicine Course (MEDTAC course). This course was developed in 2005 based on expert stakeholder opinion, epidemiology of injuries found in the field, the needs of combat nursing students, and existing international tactical courses, adapted to the Colombian environment, geography, and resources.

Since then, several groups of combat nursing students have been specially trained to provide immediate and emergent care under fire and during evacuation as a medical support force to the CNP. Our objective was to evaluate the effectiveness of this course in imparting knowledge and skills to the combat nursing students.

Methods

Setting and Design

The course is based on international military trauma training programs applied to the prehospital combat environment in Colombia. The content for this course and the criteria for student evaluation were determined by a group of key stakeholders, including the CNP, ACAPH, and physicians, paramedics, and critical care nurses associated with the CNP. In 2001, the CNP groups COR and Junglas implemented a basic program to train regular police officers as combat nurses. The course of training consists of approximately 24 weeks, including eight weeks of theoretical classroom sessions in basic anatomy and physiology, 12 weeks of basic nurse assistance operations in a civil hospital facility including fundamental intravenous fluids and drug administration, and four weeks of technical military rescue. Since 2006, ACAPH has been certifying the students' final training through the MEDTAC course, a 26-hour program of advanced trauma training (theoretical and practical) using simulation technology and live tissue procedures. The first day covers theoretical knowledge, starting with 12 summary lectures of the course's main topics (Table 1). On the second day, five practical skill stations are used to perform procedures on simulators; then, live tissue stations are used for practice of invasive procedures in animal models (Table 2).

On the third day, a final exercise of practical evaluation is performed in a controlled jungle scenario, with simulated wounded patients. In this scenario an “ambush”-type attack is simulated on a patrol consisting of eight combat nurse students. Training ammunition is used and every patrol is supplied with a small medical carry bag (M3) for each combat nursing student and a medium-sized medical carry bag (M5) for the entire patrol. The M3 carry bag is designed for care under fire (includes a tourniquet, the external hemostatic agent Zeolite, triangular bandages, a 1,000-mL Ringer's lactate fluid bag, two 14-F intravenous catheters, scissors, and an adhesive bandage). The M5 carry bag is designed for care in a safety zone out of the line of fire (includes the M3 equipment plus four additional bags of Ringer's lactate, a bag–valve–mask device, endotracheal tubes, a Combitube, McGill forceps, and general medication such as analgesics, antibiotics, and antihistamines).

On the first day a pretest is performed to evaluate the existing level of knowledge of the students. On the third day, an examination consisting of a 45-question posttest is administered before starting the final exercise. During the final exercise, all the instructors fill out an evaluation chart with a checklist for medical management knowledge and skills procedures for each patrol. Once the students finish the third phase, a group debriefing is conducted to discuss scene management. In a closed session, instructors review pretest and posttest evaluations and a six-item questionnaire for skills aspects. A Likert scale ranging from 1 (no knowledge) to 4 (complete knowledge) is selected according to the number of correctly demonstrated skills for each topic (Table 3).

Analytical Methods

We defined *effectiveness* for the course as the ability to improve student performance on didactic testing and skills evaluations from pretest to posttest. The course instructors determined scores in the skills stations by consensus. Pre- and posttest scores were compared using a t-test with an alpha of 0.05. Results of corresponding ranked Likert scores are presented in absolute and relative frequencies. Estimation of proportions was calculated with a 95% confidence interval (95% CI). We present differences in proportions in “complete knowledge”-ranked Likert scales before and after the questionnaire. Course skills on simulation and live tissue evaluations were assessed with the z statistic.

Results

Between March 2006 and July 2007, 374 combat nursing students of the CNP were trained using the MEDTAC course. All students were previously trained in the basic 24-week combat nursing curriculum inside the CNP schools of Junglas and COR. The proportion of participants and corresponding scores before and after the theoretical part of the course are described in Table 4.

In summary, pretest scores for the course participants were 59.8% (CI 56%–64%). Posttest scores following the program improved to 98.9% (CI 98%–99%). The difference in scores before and after the course was statistically significant ($p < 0.01$). For the simulation and live tissue sessions, the proportions of participants and corresponding ranked Likert scores before and after the course are described in Table 5.

Pretest scores for the simulation and live tissue skills included six participants demonstrating “complete knowledge,” 305 participants (81.6%) demonstrating “almost complete knowledge,” 59 participants (15.8%) demonstrating “incomplete knowledge,” and four participants demonstrating “no knowledge” of the topics. After the practical session of the course, all participants (100%) demonstrated “complete knowledge” on the final evaluation.

Discussion

In 2000, the CNP started working on projects to develop better care for the casualties in Anti-Narcotics operations. Our goals were to establish a tactical medical course for the Colombian environment and develop a standard evaluation of trauma care knowledge and skills for CNP combat nurses. The standard training profile of the nurse assistant inside the COR and Junglas groups was modified because of the austerity of rural operations, injury patterns, and increased terrorist attacks on rural police stations. We evaluated the effectiveness of this course in imparting knowledge and skills to the combat nurses.

International Tactical Medicine Courses and the Need for Alternative Tactical Courses

There are a variety of courses for tactical medicine training developed by groups with experience in combat. Israel and the United States have developed specific programs for their militaries, including the Combat Casualty Care Course (C4), Combat Trauma Life Support (CTLTS), Tactical Combat Casualty Course (TC3), and Battlefield Trauma Life Support (BATLS). These programs are designed for small patrols with special devices for advanced medical care. They rely on echelons of care based on the availability of resources of each level, including field hospitals and air medical evacuation units.⁵⁻¹⁵

Similarly, programs for urban special operations groups (special weapons and tactics [SWAT] teams) were developed by private organizations and municipalities with abundant resources and short casualty-evacuation times. Internationally recognized training programs such as Prehospital Trauma Life Support (PHTLS) and Basic Trauma Life Support (BTLS) have been adapted from civil emergency medical services (EMS) versions to military versions, with a few variations in protocols but without attention to differences in the availability of trauma management resources.¹⁶⁻²³

In Colombia, specific challenges are inherent to tactical situations involving army and police nurse teams. These include difficult terrain, lack of resources, and prolonged evacuation times. Most of these international courses therefore cannot be directly applied without some adaptation to the Colombian environment.²⁴

One of the greatest obstacles found was the lack in expert clinicians (MDs) available in the immediate period of time after the casualty was evacuated. For this reason, the combat nurse must manage the most difficult aspects of prehospital care with basic training and resources. Casualty evacuation times, because of weather conditions and lack of air-transport availability, could range from eight to 24 hours, turning this situation into a chaotic experience of trauma management in a thick jungle with very poor technical resources.

In 2007, an evaluation of the Israeli Air Force Search and Rescue (SAR) unit showed comparable performance between physicians and paramedics. The authors found that certain types of missions could be performed safely with paramedic personnel (short and close to definitive care), while other types of missions may require the presence of specific expert medical teams (long-term operations and those far from definitive care). Similarly, they found that for complex missions (like Colombia's Anti-Narcotics operations), a high level of physical fitness and competencies as a combatant may be more important than the type of medical care provider. So a fit paramedic with good combat skills could be better in that setting than an experienced surgeon.²⁵

During the evaluation of our program, we found that the vast majority of the students readily learned essential trauma care when they were in a well-conducted intensive academic experience. Our students are well versed in procedures related to the tactical and operational movements of the patrol, including scene security, assistant security, and tactical medical

protocols. The live tissue models and the simulators are critical in the learning process and are especially necessary if the students lack procedural experience. On day 1, we identify specific deficits in the theoretical aspects of tactical medical knowledge. Students are then debriefed to identify the most important and useful aspects of every specific trauma management topic. On day 2, the instructors lead the students in skills improvement. Most of the nurses have the empiric knowledge of the procedures, but require reinforcement on technical aspects, as well as other aspects such as indications, contraindications, and common complication management.

On day 3, the “realistic scenario” mission allows the instructors to identify and evaluate the complete behavior of the nurse in the three tactical zones (care under fire, tactical field care, and casualty evacuation care). Each patrol is videotaped, and one of the medical instructors and three of the tactical instructors follow the operation inside the group. At the conclusion, we conduct a debriefing with the participation of the entire group and discuss lessons learned and problems faced.

Limitations

The program description and evaluation are limited by the lack of standardized instruments for the testing of students' knowledge. The MEDTAC course has evolved from its inception in 2001 to its current form through an iterative process. The ability of the course to improve clinical care in actual combat is unknown.

Conclusion

The MEDTAC course is effective at improving the knowledge and skills of combat nurses serving in the Colombian National Police. MEDTAC represents a customized approach for military trauma care training in Colombia. This course is an example of specialized training available for groups that operate in austere environments with limited resources.

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References

1. International Crisis Group. War and drugs in Colombia. Latin American Report. 2007; 11:1–4.
2. Aguirre, K.; Muggah, R.; Restrepo, J.; Spagat, M. Conflict Analysis Resources Center (CERAC). Small arms survey; Oxford, Geneva: 2006. Colombia's hydra: the many faces of gun violence.
3. Isikoff, M. Up to 100 military advisers to be sent to Colombia; DEA agents to resume attacks in Peru. The Washington Post; Washington, DC: September 1. 1989 p. A1
4. Evans, M. War in Colombia, Guerrillas, Drugs and Human Rights in U.S.–Colombia Policy, 1988–2002. George Washington University; Washington, DC: 2002. Colombian Documentation Project, National Security Archive Electronic Briefing Book No. 69
5. Riley B, Mahoney P. Battlefield trauma life support: its use in the resuscitation department of 32 Field Hospital during the Gulf War. Mil Med. 1996; 161(9):542–6. [PubMed: 8840795]
6. Sohn VY, Runser LA, Puntel RA, et al. Training physicians for combat casualty care on the modern battlefield. J Surg Educ. 2007; 64(4):199–203. [PubMed: 17706571]
7. Sohn VY, Miller JP, Koeller CA, et al. From the combat medic to the forward surgical team: the Madigan model for improving trauma readiness of brigade combat teams fighting the Global War on Terror. J Surg Res. 2007; 138(1):25–31. [PubMed: 17196987]

8. Blumenfeld A, Kluger Y, Ben Abraham R, Stein M, Rivkind A. Combat trauma life support training versus the original advanced trauma life support course: the impact of enhanced curriculum on final student scores. *Mil Med.* 1997; 162(7):463–7. [PubMed: 9232974]
9. Cancio LC, Goforth GA. Emergency medical training in the 82d Airborne Division. The Gulf War experience. *Prehosp Disaster Med.* 1993; 8(4):345–8. [PubMed: 10155478]
10. Butler FK Jr. Tactical medicine training for SEAL mission commanders. *Mil Med.* 2001; 166(7): 625–31. [PubMed: 11469036]
11. McManus JG, Eastridge BJ, DeWitte M, Greydanus DJ, Rice J, Holcomb JB. Combat trauma training for current casualty care. *J Trauma.* 2007; 62(6 suppl):S13. [PubMed: 17556940]
12. Blumenfeld A, Ben Abraham R, Stein M, et al. The accumulated experience of the Israeli Advanced Trauma Life Support program. *J Am Coll Surg.* 1997; 185(1):8–12. [PubMed: 9208954]
13. Kluger Y, Rivkind A, Donchin Y, Notzer N, Shushan A, Danon Y. A novel approach to military combat trauma education. *J Trauma.* 1991; 31(4):564–9. [PubMed: 2020042]
14. De Lorenzo RA. Improving combat casualty care and field medicine: focus on the military medic. *Mil Med.* 1997; 162(4):268–72. [PubMed: 9110553]
15. Peoples GE, Gerlinger T, Budinich C, Burlingame B. The most frequently requested precombat refresher training by the Special Forces medics during Operation Enduring Freedom. *Mil Med.* 2005; 170(1):31–7. 170. [PubMed: 15724851]
16. Heiskell LE, Tang DH. Tactical emergency medical support of law enforcement special operations teams. *SWAT Magazine.* 1996; 2:23–8.
17. Hansen D. International school of tactical medicine: the best medicine in the worst places. *SWAT Magazine.* 2007; 5:48–55.
18. Heiskell L. Medical alert: training you to save lives. *Tactical Weapons Magazine.* 2007; 9:91–2.
19. Heiskell L. Tactical medicine for law enforcement. *PORAC Law Enforcement News.* 2007; 39:8–10.
20. Heiskell LE. First aid, tactically trained medical personnel are a critical element in SWAT operations. *POLICE.* 2006; 30(3):28–34.
21. Ciccone TJ, Gann CA, et al. Successful development and implementation of a tactical emergency medical technician training program for United States federal agents. *Prehosp Disaster Med.* 2005; 20:36–9. [PubMed: 15748013]
22. Bozeman WP, Eastman ER. Tactical EMS: an emerging opportunity in graduate medical education. *Prehosp Emerg Care.* 2002; 6(3):322–4. [PubMed: 12109577]
23. Rinnert K, Hall W. Tactical emergency medical support. *Emerg Med Clin North Am.* 2002; 20(4): 929–52. [PubMed: 12476888]
24. Husum H. Effects of early prehospital life support to war injured: the battle of Jalalabad, Afghanistan. *Prehosp Disaster Med.* 1999; 14(2):75–80. [PubMed: 10558320]
25. Bar-Dayyan Y, Levy G, Goldstein L, et al. Physician versus paramedic in the setting of ground forces operations: are they interchangeable? *Mil Med.* 2007; 172(3):301–5. [PubMed: 17436776]

Figure 1. Combat nursing students patrol. Every student has a M3 carry bag (right) that contains medical materials for external hemorrhage control under fire situation, including external bandages, fluids and external haemostatic agents. (Images: Authors).

Figure 2.
Combat nurse students of CNP. “PIJAOS” School; Espinal (COLOMBIA). (Image: CNP PIJAOS School, COR and JUNGLAS groups).

Figure 3. Combat nurse students in action. Injured patients need emergency trauma care during anti-narcotics operations. (Images: CNP COR and JUNGLAS groups).

Table 1**Complete Lecture Program**

Tactical Medical Scenes: Zones I, II and III
History and Development of Combat Casualty Care
Kinematics of Trauma: Ballistic and Blast Waves
Hemorrhagic Shock: Pathophysiology and IV–IO Therapy
Hemorrhagic Shock: Bleeding Control and New Hemostatic Agents
Airway: Basic and Advanced Management in the Field
Thoracic and Abdominal Trauma
Extremity Injuries: Vascular Penetrating Trauma and Blast Injuries
Central Nervous System Trauma: Spine and Brain Injuries and Therapy in the Field
Scorpions and Snake Bite Therapy: Biological Risk on Tactical Environment
Field Medications: Analgesics, Antihistaminic and Antibiotics
Triage, MEDEVAC and CPR: Indications and Utility in the Field

CPR = cardiopulmonary resuscitation; IV–IO = intravenous–intraosseous; MEDEVAC = medical evacuation.

Table 2**Medical Simulation Skills and Live Tissue Procedures**

Medical Simulation Skills:

- 1 Airway management (endotracheal intubation, digital intubation, Combitube, and nasal airway)
 - 2 CPR (AHA 2005 guidelines)
 - 3 IV and IO therapy (standard fluids, drip and medications, and venous and intraosseous access)
 - 4 General trauma assessment (evaluation of A, B, C, D, and E in zone III)
 - 5 Immobilization skills (stretcher use, cervical collar use, and body-to-body general rescue skills)
-

Animal Live Tissue Procedures:

- 1 Tube thoracostomy
 - 2 Transtracheal percutaneous airway
 - 3 Management of evisceration
 - 4 Direct pressure hemostasis and external hemostatic agent use
 - 5 Dissection venous access
-

A = Airway; B = Breathing; C = Circulation; D = Disability Assessment; E = Exposure; AHA = American Heart Association; CPR = cardiopulmonary resuscitation; IO = intraosseous; IV = intravenous.

Table 3

Likert Scale Description (Simulation and Live Tissue Skills Part)

Likert Scale		Meaning
1	Don't have any degree of knowledge	0 appropriate maneuvers in a specific topic
2	Have an incomplete partial knowledge	1 appropriate maneuvers in a specific topic
3	Have a partial almost complete knowledge	2 appropriate maneuvers in a specific topic
4	Have a complete knowledge	3 appropriate maneuvers in a specific topic

Table 4

Pre- and Posttest Written Competency Scores

Topic	Mean Pretest Score	Mean Posttest Score	Difference		p-Value
			%	(95% CI)	
Concept of actions in zones I, II, and III	50%	100%	50%	44.9%–55.1%	<0.001
Tourniquet use in zones I, II, and III	57%	100%	43%	38.0%–48.1%	<0.001
Body-to-body evacuation methods	72%	100%	28%	23.5%–32.6%	<0.001
Security and operational methods of the patrol	100%	100%	0%	—	—
Placement of nasopharyngeal airway	53%	100%	47%	42.0%–52.1%	<0.001
Airway basic maneuvers	80%	100%	20%	15.9%–24.1%	<0.001
Thoracic trauma assessment and indications for decompression	59%	100%	41%	35.9%–45.9%	<0.001
IV therapy/identification of hemorrhagic shock degree	50%	96%	46%	40.5%–51.4%	<0.001
Evaluation of hemorrhagic stage and basic management	68%	100%	32%	27.3%–36.8%	<0.001
General evaluation of trauma patients and basic trauma scores	52%	95%	43%	37.2%–48.3%	<0.001
Advanced airway maneuvers (including Combitube and ET intubation)	50%	100%	50%	44.9%–55.1%	<0.001
Use of external hemostatic agents	60%	100%	40%	35.1%–45.1%	<0.001
Fluid therapy and basic field medications	39%	93%	54%	48.4%–59.6%	<0.001
Military and START triage and basic CASEVAC concepts	48%	100%	52%	46.8%–56.9%	<0.001

CASEVAC = casualty evacuation; CI = confidence interval; ET = endotracheal; IV = intravenous; START = simple triage and rapid treatment.

Table 5
Knowledge of the Students in Pre- and Posttests of Simulation and Live Tissue Stations and Corresponding Likert Scores

Topic	(N = 374)	Likert Scale			
		Non-Knowledge Mean % (95% CI)	Incomplete Partial Knowledge Mean % (95% CI)	Partial Almost Complete Knowledge Mean % (95% CI)	Complete Knowledge Mean % (95% CI)
Thoracic injury patterns and thoracostomy placement	Pretest	0	0	100.0	0
	Posttest	0	0	0	100.0
Thoracic injury patterns and occlusive dressing valve placement	Pretest	0	0	100.0	0
	Posttest	0	0	0	100.0
Vein dissection for IV access	Pretest	5.9 (3.5–8.3)	94.1 (91.7–96.5)		
	Posttest	0	0	0	100.0
Puncture cricothyroidotomy	Pretest	0	0	100.0	0
	Posttest	0	0	0	100.0
Use of external hemostatic agent (Zeolite type)	Pretest			89.6 (86.5–92.7)	10.4 (7.3–13.5)
	Posttest	0	0	0	100.0
Differences between arterial and venous bleeding	Pretest	0	0	100.0	0
	Posttest	0	0	0	100.0
Total test's practical concepts	Pretest	1.1 (0–2.1)	15.8 (12.1–19.5)	81.6 (77.6–85.5)	1.6 (0.3–2.9)
	Posttest	0	0	0	100.0

CI = confidence interval; IV = intravenous.