Pain and Trauma: A Foray into Military Nursing Research

DHA Celebration of the Year of the Nurse and Midwife

USU
Uniformed Services University

PRESENTER

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- The opinions and assertions expressed herein are those of the author and do not necessarily reflect the official policy or position of the Uniformed Services University, United States Navy, or the Department of Defense.
- All research protocols described herein were reviewed and approved by the appropriate institutional review board (IRB) in accordance with all applicable Federal regulations governing the protection of human subjects in research.
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- Commercial support was not received for this activity.
- Research is NOT all “pain and trauma” – it is the way to systematically build knowledge, and helps to form the basis of professional nursing care.

Learning Objectives:

At the end of this presentation the learner will be able to:

1. Describe triggers to military-focused research.
2. Identify key areas where more research is needed to assist clinical practice decisions.
3. List three critical perspectives that nurses can bring to research.
4. Discuss research challenges in military trauma research.

Set the stage…

My Background/key military clinical experiences

- Staff Nurse – Naval Medical Center San Diego med-surg, then ICU (total 4 years)
- Training Officer - 3rd Medical Battalion, Okinawa, Japan
- Master's in Trauma & Critical Care Nursing, UC-San Francisco
- Clinical Nurse Specialist - Naval Medical Center Portsmouth ICU
- Ship's Nurse – USS GEORGE H.W. BUSH (CVN 77)
- PhD in Nursing -UC-San Francisco – focus on pain care after traumatic injury
- Nurse Scientist WRNMMC
- Faculty, Daniel K. Inouye Graduate School of Nursing at USU

Roadmap for this talk…

- Follow a journey of questions and review the research they led to, the methods and findings, and implications for future research to support military nursing practice

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.universitycoaching.it%2Fcategory%2Fposts%2Fpage%2F2%2F&psig=AOvVaw1_OIlQssMC1d1WcJevbd7f&ust=1588682641224000&source=images&cd=vfe&ved=2ahUKEwjWqpmVnprpAhXtQDABHRvzAQoQr4kDegQIARAY

Curiosity…and opportunities

The importance of knowing the culture and social environment

- Research is needed for answering clinical questions and understanding how policies (– *and politics*!) can impact health behaviors and subsequent illness
- 1998: The Master Settlement Agreement (MSA) between the four largest tobacco producers in the US and the Attorneys General of 46 states
- → In addition to huge amounts of $$$ to pay for Medicaid and Medicare tobacco-related disease, released INTERNAL INDUSTRY DOCUMENTS to the public

Taking the plunge…policy research

Full-time out-service education enabled me to work with leading researchers:

Ruth Malone, PhD, RN, FAAN and

Elizabeth Smith, PhD

After a class on THEORIES of health policy, I was intrigued

- Tobacco Industry and the U.S. Military

- This multi-site collaborative project uses tobacco industry documents, interviews, and analysis of policies to study the influence of the tobacco industry on the U.S. military.

https://tobacco.ucsf.edu/

How had the tobacco industry influenced Military tobacco policy?

- **Research Questions:**
  - Why, given the knowledge that tobacco use harms military readiness, reduces fitness, and increases both long and short term health care costs, did the military continue to sell tobacco products at low prices?
- **Methods:**
  - Historical Case study by document review and synthesis of over 500 documents, 1980-2003
  - Congressional Documents on the Thomas database
  - Military Documents on DefenseLink (www.defenselink.mil)
  - Government documents on internet, news stories on Lexis-Nexis database
  - Informal interviews with key informants

Results

RESULTS

Overview

Between 1985 and 2001, both DoD and Congress repeatedly attempted to increase commissary cigarette prices (table 1). Until 1996, these efforts were thwarted by tobacco industry opposition and division and ambivalence in both DoD and Congress. Amid concerns that changes to the commissary system threatened individual or agency authority, the tobacco industry exploited the lack of unanimity among various branches of DoD, Congress, commissaries and exchanges.

So what?

Contributions…

- As a military nurse on the team, I added *CRITICAL* understanding of military culture and social environment
- Documentation matters!
- Publishing research in leading journals can provide policy makers with information to make better decisions, or understand the process.

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RESEARCH PAPER

Death at a discount: how the tobacco industry thwarted tobacco control policies in US military commissaries

Elizabeth A Smith, Viginia S Blackman, Ruth E Malone

Tobacco Control 2007;16:38–46. doi: 10.1136/tc.2006.017350

See end of article for authors' affiliations

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Background: The US military is perhaps the only retailer consistently losing money on tobacco. Military stores (commissaries and exchanges) have long sold discount-priced cigarettes, while the Department of Defense (DoD) pays directly for tobacco-related healthcare costs of many current and former customers. Tobacco use also impairs short-term troop readiness.

Objective: To examine the long struggle to raise commissary tobacco prices and the tobacco industry's role in this policy effort.

Methods: Analysis of internal tobacco industry documents, searches of government and military websites and newspaper databases, and interviews with key informants identified in the documents.

Results: Efforts to raise commissary tobacco prices began in the mid-1980s. Opposition quickly emerged. Some military officials viewed tobacco use as a "right" and low prices as a "benefit". Others raised issues of authority, and some saw the change as threatening the stores. The tobacco industry successfully exploited complex relationships among the Congress, the DoD, commissaries, exchanges and private industry, obstructing change for over a decade. Leadership from the Secretary and Assistant Secretaries of Defense, presidential support and procedural manoeuvring finally resulted in a modest price increase in 1996, but even then, high-level military officials were apparently threatened with retaliation from pro-tobacco Congressmen.

Conclusions: The long-standing military tradition of cheap cigarettes persists because of the politics of the military sales system, the perception within the military of tobacco use as a right, and tobacco industry pressures. Against its own best interests, the US military still makes tobacco available to service members at prices below those in the civilian sector.

The US military includes 1.4 million active duty personnel, stationed worldwide. Their smoking prevalence is higher (33.8% in 2002) than the US Department of Defense (DoD) goal of ⩽20%,[1] exceeding the civilian rate of 23.6%.[2] Smoking diminishes even short-term troop health and readiness[3 4] and increases medical and training costs.[5 6] As an authoritarian, hierarchical institution, DoD should, theoretically, be able to establish and implement strong tobacco control policies. Nonetheless, DoD sells its personnel tobacco products virtually tax free. Military health personnel and some members of Congress have long sought to address this contradiction. This case study shows how for more than a decade, the tobacco industry worked to defeat policy changes by framing cheap cigarettes as a "benefit", mobilising Congressional and military-affiliated allies, and exploiting DoD ambivalence about tobacco.

BACKGROUND

The military market

The military is a fertile field for tobacco sales[7]: a pool of people near the typical age of smoking uptake[8] entering an institution with high smoking prevalence. Military recruits skew towards some of the tobacco industry's prime targets: young adults, high school educated and African-American.[9] Additionally, DoD sells tobacco products (it formerly also distributed them free)[10] through its resale system, which includes commissaries (grocery stores) and exchanges (department stores) located on military bases worldwide and open only to military personnel and beneficiaries.

The military resale system: commissaries and exchanges

Commissaries and exchanges were originally created to provide service members in all locations access to consumer goods at the same low prices. Currently, increased military pay, base closures and civilian discount stores have rendered them less important.[11] However, the resale system is a component of the military compensation package.[12 13]

Commissaries sell goods at cost plus a 5% surcharge for overhead (United States Code. Title 10. Section 2486). Commissary shoppers save about 30% off civilian grocery store prices. The less-subsidised *exchanges* discount prices approximately 20%. Exchange profits fund Morale, Welfare, and Recreation (MWR) programmes, such as fitness centres and libraries, on military bases.[11] Sales at commissaries and exchanges are free from state or local taxes. In the 1980s and early 90s many US jurisdictions raised tobacco taxes to reduce use[14–16]; access to lower-priced untaxed cigarettes, however, obviates the effect of taxation on military personnel.

Congress has oversight of commissaries, because they are subsidised with appropriated funds; it has no direct authority over exchanges (fig 1). During the 1980s, the expense of a peace-time military caused Congress and DoD to consider whether subsidising commissaries was cost effective.[17 18] The proposals to raise tobacco prices discussed in this paper were thus raised during a time when the commissary system were perceived to be vulnerable.

METHODS

Some seven million tobacco industry internal documents have been made public through US state attorneys general litigation. We searched the Legacy Tobacco Documents Library (http://legacy.library.ucsf.edu/index.html) and http://tobaccodocuments.org using a snowball strategy,[19] beginning with keywords (eg,

Abbreviations: DoD, Department of Defense; HASC, House Armed Services Committee; MWR, Morale, Welfare and Recreation

www.tobaccocontrol.com

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Questions “at my level…” in 2009

- Conflicts are raging in Iraq and Afghanistan
- Large numbers of personnel with severe and painful injuries
- Critical need for effective treatment of pain
- Influence of early pain control on long term outcomes (??)
- Pushing surgical care far forward results in new roles for nurses in En Route Care
- What does “adequate training” mean for a Corpsman or Medic? Or for a Nurse?

TRIGGER!!!

2009 Update to
Tactical Combat Casualty Care (TCCC)

Assessment and treatment of PAIN is now a recommended intervention
In the TACTICAL FIELD CARE stage – with NEW ANALGESIC OPTIONS:

- Fentanyl Lozenges
- Intravenous Ketamine
- Morphine autoinjectors (in use for >50 years)

Back to school…

University of California San Francisco UCSF School of Nursing

My big "WHY?" : What is the best way to treat pain on the battlefield in order to optimize long term outcomes?

Transition from acute to chronic pain….

- Pathologic changes may occur in the brain and peripheral nervous system when processing acute pain sensations
- Sensory nerves may begin to transmit painful impulses, even without any external stimuli
- Pain can continue over time, resistant to common analgesic interventions
- Persistent or chronic pain - a major disruption of the pain neurological system
- Precise moment acute pain becomes chronic is unknown

Kyranou & Puntillo (2010);
Flor (2002);
Dickenson & Kehlet (2014)

Research Questions:

- What is the prevalence of prehospital (PH) and Emergency Department (ED) pain assessment documentation?
- What is the mean pain severity in PH and ED?
- What is the rate of PH analgesic administration?
- What are the demographic, clinical, and health system characteristics that predict these outcomes?

Methods

INCLUSION CRITERIA

- US military personnel
- First combat zone traumatic injury
- Required inpatient care
- January 1, 2010 – August 31, 2013

EXCLUSION CRITERIA

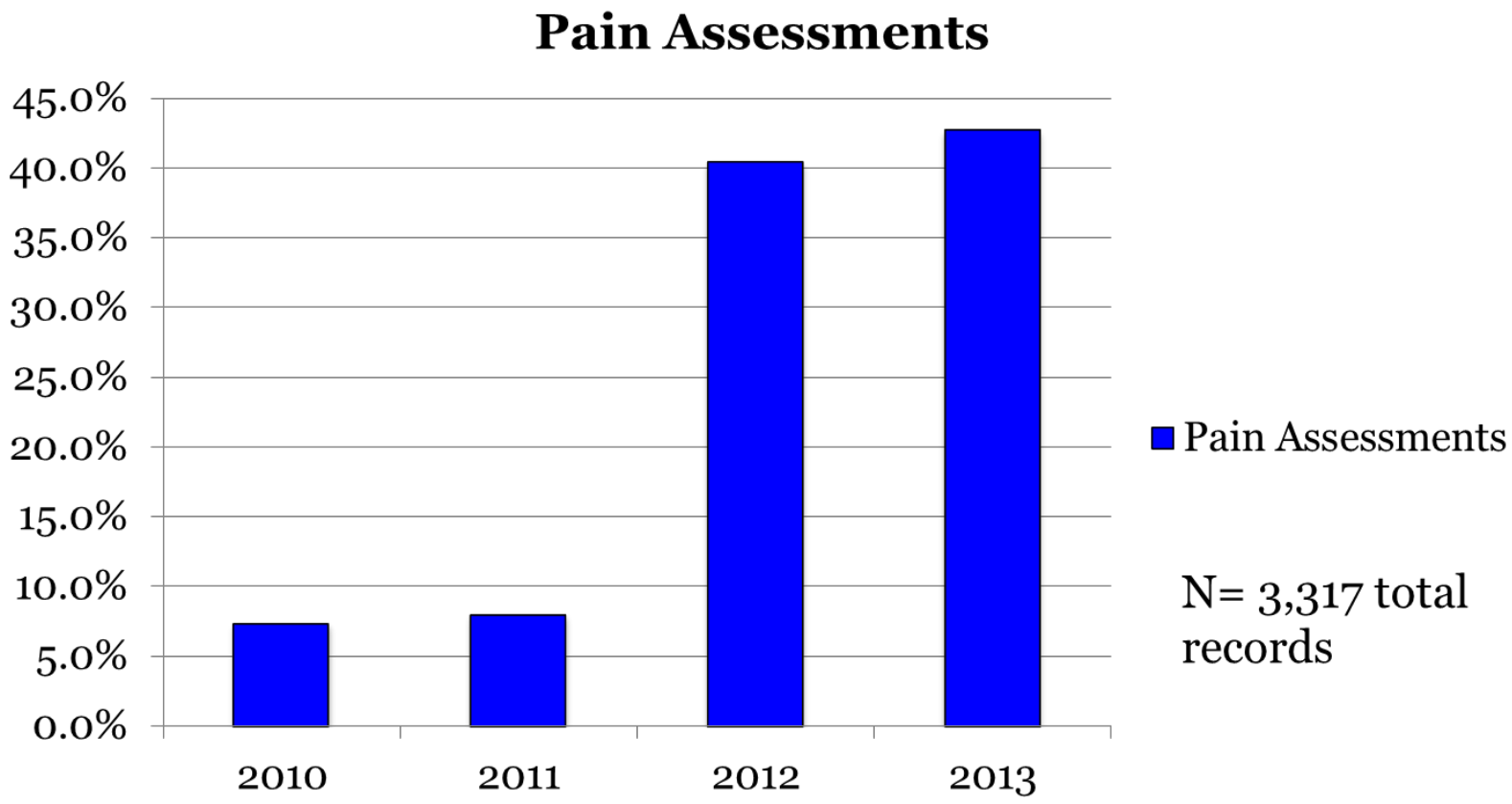
- Iraqi, Afghan, Coalition military personnel
- Civilians
- Enemy combatants
- US military personnel who required outpatient care only
- Patients dead on arrival to first ED

PH Pain Assessment

37.8%

(N = 1,253 OF 3,317)

IN THE PH ASSESSMENT AND ANALGESIC USE SAMPLE INCLUDED PH PAIN ASSESSMENT DOCUMENTATION



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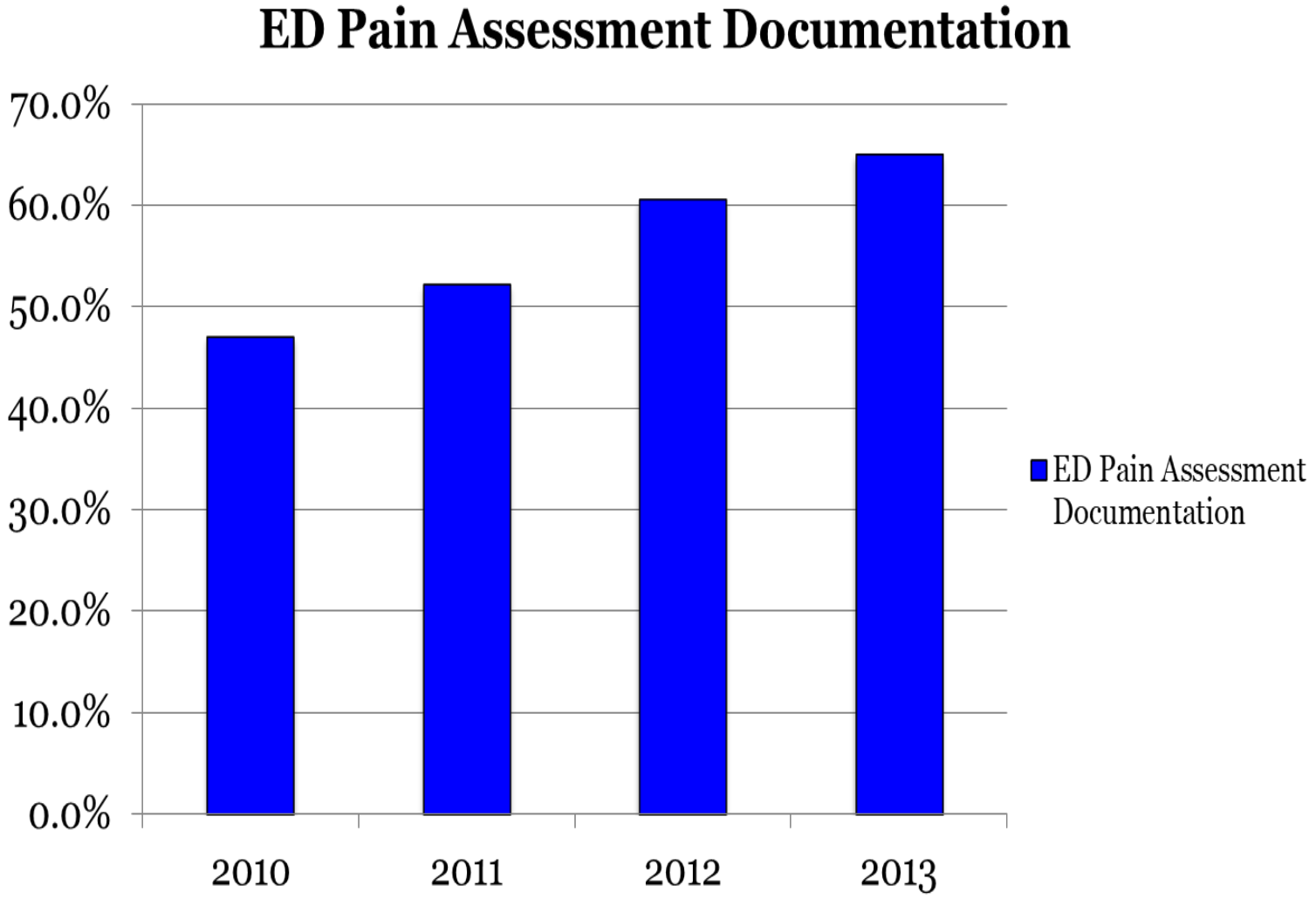
ED Pain Assessment

60.5% *(N=3,339)*
OF 5,518 RECORDS EVALUATED WITH

ED PAIN ASSESSMENT DOCUMENTATION



Pain Severity

PH

- Range from 0 – 10
- Mean pain severity score: 5.5 (SD = 3.1)
- Median pain severity score: 6 (IQR = 3 – 8)

ED

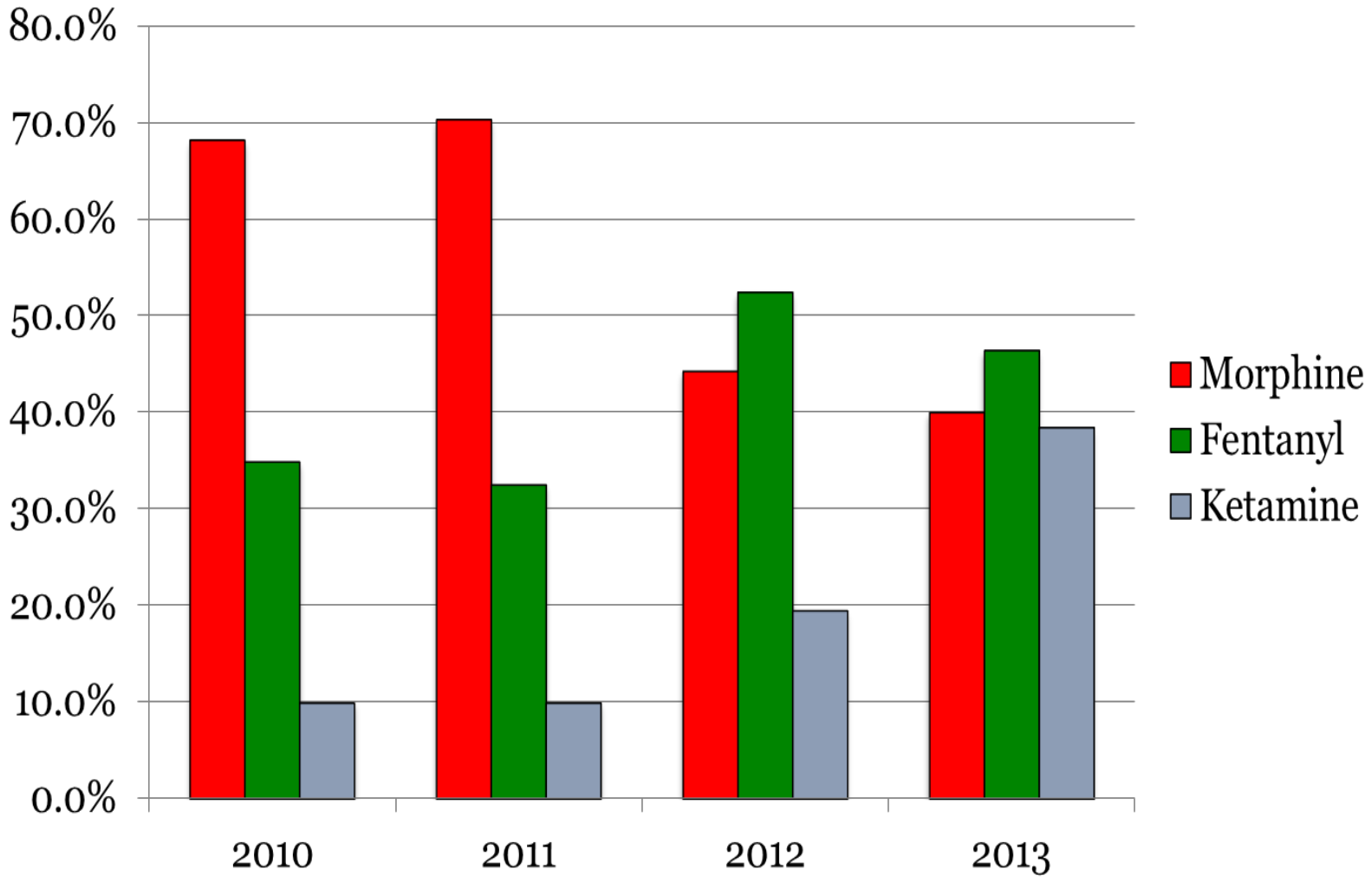
- Range from 0 – 10
- Mean pain severity score: 5.5 (SD = 3.2)
- Median pain severity score: 6 (IQR = 3-8)

PH Analgesic Use by Year

50.8%

OF PH ASSESSMENT AND ANALGESIC SAMPLE

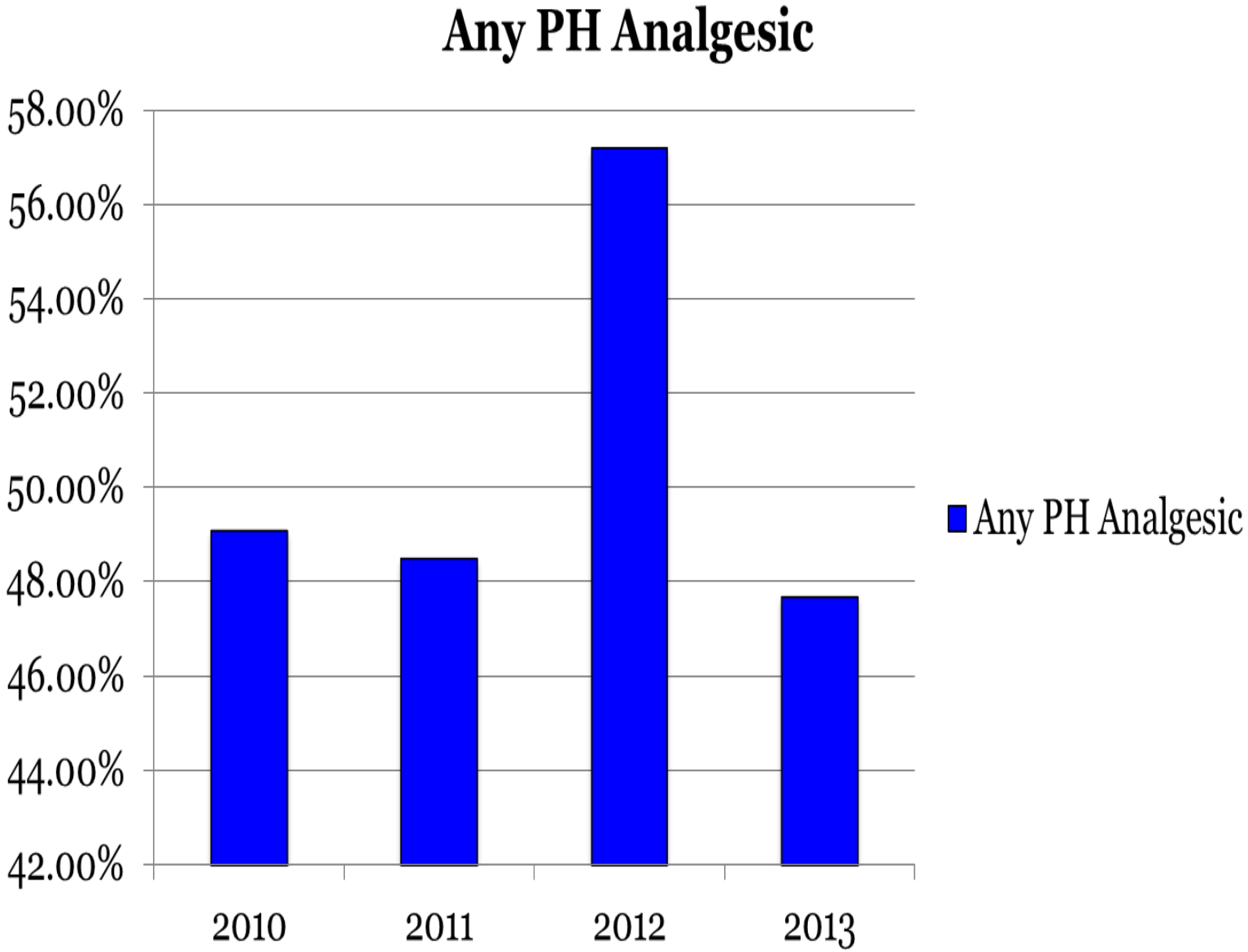
(N = 1,684)



PH Analgesic over time

FEWER THAN 50%

(ON AVERAGE) RECEIVED PH ANALGESICS.



Now what?

Limitations

- Large proportion of missing data
- Could not evaluate effectiveness of analgesic interventions
- Could not link PH care to ED assessment
- Findings may be sample-specific → need to be replicated in another sample
- Could not control for variations in PH provider skills and resources

Implications

- Documentation of PH and ED pain assessment is possible, even in the combat zone; still poor
- **Vital signs alone should not be used to predict pain severity**
- Regular feedback to clinicians about their PH and ED care may improve patient care
- Research is needed to understand outcomes of analgesic interventions at different times

Published!

FOCUS ON PAIN MANAGEMENT

PREVALENCE AND PREDICTORS OF PREHOSPITAL PAIN ASSESSMENT AND ANALGESIC USE IN MILITARY TRAUMA PATIENTS, 2010–2013

Virginia Schmied Blackman, RN, PhD, CNS, Bruce A. Cooper, PhD, Kathleen Puntillo, RN, PhD, FAAN, FCCM, Linda S. Franck, RN, PhD, FRCPCH, FAAN

ABSTRACT

Introduction: Pain is the most common symptom in patients presenting, for prehospital (PH) care. Research in civilian emergency medical systems has shown wide variability in PH pain assessment and analgesic practices, yet a minimal amount is known about pain assessment and analgesic intervention practices in the military, particularly when PH care is delivered in a combat zone. **Objective:** To describe prehospital (PH) pain care practices for U.S. military personnel injured in Iraq and Afghanistan 2010–2013 and explore potential relationships to explain variation. **Methods:** An exploratory retrospective, cross-sectional study of Department of Defense Trauma Registry data from 2010 to 2013 was performed. Demographic, clinical, or health system variables for associations with three outcomes: 1) pain assessment documentation; 2) pain severity (0–10 scale); and 3) analgesic administration (yes/no). Including only variables with significant associations, backward stepwise regression was used to develop explanatory models for each outcome. **Results:** Patient records (n = 3,317) were evaluated for documentation of PH pain assessment and analgesic administration. The prevalence of PH pain score documentation was 37.8% (n = 1,253). Overall, the proportion of records with PH pain scores increased over time: 19.8% (2010), 35.1% (2011), 58.2% (2012), and 62.2% (2013). Severity of pain scores ranged 0–10; mean = 5.5 (SD = 3.1); median = 6 (IQR = 3–8). Analgesics were reported for 50.8% (n = 1,684), of whom 38.3% had a pain severity score documented. The pain assessment documentation model included any documented vital signs, injury year, and mechanism of injury and explained 19.2% of the variance in documentation. The pain severity model included vital signs and injury severity score (ISS) and explained 5.0% of the variance in severity. The analgesic model included any vital signs, pain severity, trauma type, mechanism of injury, ISS, and year. **Conclusions:** Pain assessment and treatment documentation improved each year, but remain suboptimal. Available data yielded poor prediction of the outcomes of interest, emphasizing the importance of individual assessment. Analgesic effectiveness could not be evaluated. **Key words:** pain measurement; prehospital; analgesia; trauma; military

PREHOSPITAL EMERGENCY CARE 2016;20:737–751

INTRODUCTION

Trauma is the leading cause of death and disability for persons under age 65 in the United States (U.S.)[1] and worldwide[2] and is, frequently, accompanied by moderate to severe pain.[3–5] Inadequately treated pain can interfere with recovery from trauma and become chronic and debilitating,[6,7] and increase risk for post-traumatic stress disorder (PTSD).[8–10] For example, 46–80% of civilian trauma survivors report persistent post-trauma pain measured 4 months to 6 years post-injury.[11–14] Among military combat-related trauma survivors at polytrauma rehabilitation centers, 68%[15] to 82%[8] reported ongoing pain, and 20% report PTSD.[8] An important element of optimal emergency care after traumatic injury is pain assessment and

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Declaration of Interest: Virginia Blackman has nothing to disclose.

V.S. Blackman is an active duty Commander in the U.S. Navy, Nurse Corps. This paper was produced as part of her duties when assigned as a full-time doctoral student at the School of Nursing, University of California, San Francisco.

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RESEARCH

Demographic, Clinical, and Health System Characteristics Associated With Pain Assessment Documentation and Pain Severity in U.S. Military Patients in Combat Zone Emergency Departments, 2010–2013

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ABSTRACT

Emergency department (ED) pain assessment documentation in trauma patients is critical to ED pain care. This retrospective, cross-sectional study used trauma registry data to evaluate U.S. military combat zone trauma patients injured between 2010 and 2013 requiring ≥ 24-hr inpatient care. Study aims were to identify the frequency of combat zone ED pain assessment documentation and describe pain severity. Secondary aims were to construct statistical models to explain variation in pain assessment documentation and pain severity.

Pain scores were documented in 60.5% (n = 3,339) of the 5,518 records evaluated. The proportion of records with ED pain scores increased yearly. Pain assessment documentation was associated with documentation of ED vital signs, comprehensive facility, more recent year, prehospital (PH) heart rate of 50–100 beats/min, ED Glasgow Coma Scale score of 15 vs. 14, blunt trauma, and lower injury severity score (ISS).

Pain severity scores ranged from 0 to 10; mean = 5.5 (SD = 3.1); median = 6. Higher ED pain scores were associated with Army service compared with Marine Corps, respiratory rate < 12 or >16, moderate or severe ISS compared with minor ISS, treatment in a less-equipped facility, and injury in 2011 or 2012 vs. 2010. The pain severity model explained 20.4% of variance in pain severity. Overall, frequency of pain assessment documentation in combat-zone EDs improved yearly, but remained suboptimal. Pain severity was poorly predicted by demographic, clinical, and health system variables available from the trauma registry, emphasizing the importance of individual assessment.

Key Words

Emergency nursing, Military trauma care, Pain assessment, Pain assessment documentation, Pain severity, Trauma, Trauma nursing

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Author contributions: VS B. conceived and designed the study, obtained the data, completed data analysis and drafted the manuscript under the primary supervision of L.S.F., with contributions from K.P. and B.A.C. B.A.C. provided statistical advice on study design, data management, and data analysis. All authors contributed substantially to the manuscript's revision. V.S.B. takes responsibility for the paper as a whole.

The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of the Navy, Department of Defense, the U.S. Government, or the University of California. All of the authors attest they have nothing to disclose.

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Inadequate pain care in the emergency department (ED) has been reported as a major problem since 1989 (Wilson & Pendleton, 1989). Pain prevalence among traumatically injured patients is as high as 91%, and more than half of patients report moderate to severe pain (Berben et al., 2008). Evidence suggests that inadequately treated acute pain contributes to development of chronic pain and development of posttraumatic stress disorder (PTSD) (Holbrook, Galarneau, Dye, Quinn, & Dougherty, 2010; McGhee et al., 2011; Saxe et al., 2001; Schreiber & Galai-Gat, 1993; Stoddard et al., 2009). Schreiber et al., 2012; Gilbertson et al., 2010; Haskell et al., 2009; Higgins et al., 2014; Richardson, Frueh, & Acierno, 2010). From 46% to 85% of hospitalized trauma survivors report chronic injury-related pain up to 6 years postinjury. (Gross & Ansler, 2011; Lew et al., 2009; Timmers,

En Route Care

- Connected with others who were interested in Navy trauma care particularly, and the training and outcomes for Navy personnel
- Concern: Navy En Route Care providers have a wide variety of training, non-standardized sustainment training, and their overall readiness for each element of the ERC mission has not been studied
- Navy uses Search & Rescue Medical Techs, Nurses, and occasionally Flight Surgeons (usually GMOs) to provide ERC
- Each pipeline has DRAMATICALLY different education & training requirements; no reliable outcome data available due to poor documentation

So many questions…

Comparison between clinician types in:

PRIMARY ACTIONS

"in flight" TCCC Skills

- Apply tourniquet
- Administer Blood Products
- Perform Needle Decompression

SECONDARY ACTIONS

Additional essential skills

- Pre-Transfer Patient Assessment
- Pain Assessment, administer analgesic
- Post-transfer Handoff Report
- Education and experience compared to civilian peers

Methods

- Prospective, multi-center, observational study using a standardized, timed, high-fidelity simulation with expert observers blinded to participant type, standardized simulation observations (5 minute pre-assessment, 20 min “flight”)
- Sample:
  - 30 RNs eligible for Navy En Route Care missions (Critical Care or Emergency)
  - 29 Search & Rescue HM-8401 (of ~70 currently on active duty)
- SETTING: Portable “helo” of PVC and tarp made to size specifications of most common platform, with sound and wind effects, and one non-medical crew chief

The HELO

Single Patient, Single Provider, Safety Observer, NO COMMS in HELO

IN FLIGHT

Pre-Transfer Assessment/ Handoff

All photos by CDR J. A. Alex, MC USN, used with permission

Primary Results:

BLUF: NEITHER GROUP PERFORMED ALL CRITICAL ACTIONS CONSISTENTLY AND ACCURATELY

TQ

Application Tourniquet	ERC RNs	SMTs	p value
Performed	60%	72%	0.31
Accurately	39%	86%	<0.05

Blood

Blood Products	ERC RNs	SMTs	p value
Performed	79%	17%	<0.05

Limitation: multiple uses of "PRBC" bag prevented accuracy testing.

Needle-D

Needle Decompression	ERC RNs	SMTs	p value
Performed	79%	33%	<0.05
Accurately	83%	79%	0.31

Secondary Results

Pre-Transfer & Pain Assessment

	ERC RN	SMT	p-value
Expose Patient	48%	59%	0.43
Vent Settings?	24%	31%	0.55
Full O2 Tank?	21%	28%	0.54
IV Patency?	24%	21%	0.15
Give Analgesic	24%	10%	0.15

Overall - No participants performed all pre-transfer assessment elements correctly

Handoff

	ERC Nurses	SMTs	p-value
Initial Patient History	84%	87%	1.0
Current Assessment	91%	71%	0.09
Medications Administered	71%	39%	0.03
Interventions Performed	97%	88%	0.32

Overall – 53% of participants performed all 4 handoff elements, 37% of those correctly

Implications

IMPROVEMENTS IN INITIAL AND SUSTAINMENT TRAINING NEEDED

- Navy ERC providers demonstrated difficulty with recognition and treatment of injuries most likely to lead to pre-hospital death: hemorrhage and pneumothorax.
- Neither clinical group was proficient across all skills
- Standardized pre-transfer assessments and hand-off reports were not observed
- Education, training, and experiences of Navy ERC providers were NOT equivalent to minimum civilian requirements
- Simulation enables important opportunity for prospective research in challenging environments

What happened?

MILITARY MEDICINE, 00, 0/0:1, 2018

An Evaluation of Navy En Route Care Training Using a High-Fidelity Medical Simulation Scenario of Interfacility Patient Transport

LCDR Christine A. DeForest, DO*; CDR Virginia Blackman, PhD, RN, CNS†; CDR John E. Alex, MD, CHSE‡; Lauren Reeves, MsPH, BS§; Alejandra Mora, BS§; Crystal Perez, BSN, RN§; Maj Joseph Maddry, MD§; LCDR Domanique Selby, BSN, RN‖; CDR Benjamin Walrath, MD¶

ABSTRACT Introduction: Military prehospital and en route care (ERC) directly impacts patient morbidity and mortality. Provider knowledge and skills are critical variables in the effectiveness of ERC. No Navy doctrine defines provider choice for patient transport or requires standardized provider training. Frequently, Search and Rescue Medical Technicians (SMTs) and Navy Nurses (ERC RNs) are tasked with this mission though physicians have also been used. Navy ERC provide training varies greatly by professional role. Historically, evaluations of ERC and patient outcomes have been based on retrospective analyses of incomplete data sets that provide limited insight on ERC practices. Little evidence exists to determine if current training is adequate to care for the most common injuries seen in combat trauma patients. Materials and Methods: Simulation technology facilitates a standardized patient encounter to enable complex, prospective data collection while studying provider type as the independent variable. Information acquired through skill performance observation can be used to make evidence based recommendations to improve ERC training. This IRB approved multi-center study funded through a Congressionally Directed Medical Research Program grant from the Combat Casualty Care Intramural Research Joint En Route Care portfolio evaluated Navy ERC providers. The study evaluated 84 SMT, ERC RN, and physician participants in the performance of critical and secondary actions during an immersive, high fidelity, patient transport simulation scenario focused on the care during an interfacility transfer. Simulation evaluators with military ERC expertise, blinded to participant training and background, graded each participant's performance. Inter rater reliability was calculated using Cohen's Kappa to evaluate concordance between evaluator assessments. Categorical data were reported as frequencies and percentages. Performance attempt and accuracy rates were compared with Fischer exact test where appropriate. Tests were two-tailed and we considered results significant, that is, a difference not likely due to chance, where $p < 0.05$. Confidence intervals were used to present overlap in performance between provider types. Results: Critical and secondary actions were assessed. A majority of providers completed at least one of the critical life saving actions; only one participant completed all critical actions. Evaluation of critical actions demonstrated that a tourniquet was applied by 64% of providers, blood products administered by 26%, needle decompression performed by 51%, and a complete handoff report performed by 44% without omission of secondary actions demonstrated analgesic was accurately administered by 24% of all providers, and 44% reinforced the "hemorrhaging amputation site dressing". Conclusion: Over 98% of participants failed to properly perform all critical actions during the interfacility transfer scenario, which in a real life combat casualty transport scenario could result in a preventable death. Study results demonstrate serious skill deficits among all types of Navy ERC providers. These data can be used to improve the training of Navy ERC providers, ultimately improving care to injured soldiers, sailors, airmen, and marines.

INTRODUCTION

Background

The United States Navy (USN), which provides medical support to the Navy and United States Marine Corps (USMC), as well as international partners and civilians, uses multiple en route care (ERC) provider types whose preparation is determined by a wide variety of instructional programs and required certifications. Navy nurses (RNs) are eligible for ERC missions after 1 yr of clinical experience in Emergency or Critical Care and may have attended a Joint En route Care Course (JECC), 2 wk of hands-on training hosted by the U.S. Army to familiarize them with patient care in military

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- Multiple presentations at professional meetings – by multiple members of the team
- First paper published
- Policy: Navy increased level of training required for SMTs!
- New opportunities to collaborate

En Route Care Provided by US Navy Nurses in Iraq and Afghanistan

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BACKGROUND US Navy nurses provide en route care for critically injured combat casualties without having a formal program for training, utilization, or evaluation. Little is known about missions supported by Navy nurses.
OBJECTIVES To characterize the number and types of patients transported and skill sets required by Navy nurses during 2 combat support deployments.
METHODS All interfacility casualty transfers between 2 separate facilities in Iraq and Afghanistan were assessed. Number of patients treated, number transported, en route care provider type, transport priority level and duration, injury severity, indication for critical care transport, en route care interventions, and vital signs were evaluated.
RESULTS Of 1550 casualties, 630 required medical evacuation to a higher level of care. Of those, 133 (21%) were transported by a Navy nurse, with 131 (98.5%) classified as "urgent," accounting for 46% of all urgent transports. The primary indication for en route care nursing was mechanical ventilation of intubated patients (97%). Mean (SD) patient transport time was 29.8 (7.9) minutes (range, 17-61 minutes). The most common en route care interventions were administration of intravenous sedation (80%), neuromuscular blockade (79%), and opioids (48%); transfusions (18%); and ventilation changes (11%). No intubations, cricothyroidotomies, chest tube placements, or needle decompressions were performed en route. No deaths occurred during transport.
CONCLUSIONS US Navy nurses successfully transported critically injured patients without observed adverse events. Establishing en route care as a program of record in the Navy will facilitate continuous process improvement to ensure that future casualties receive optimized en route care. (*Critical Care Nurse*. 2018; 38[2]:e1-e6)

En route care (ERC) enables continuation of care during movement (evacuation) without clinically compromising the patient's condition.[1] In the US military, establishment of a program of record drives funding to man, train, and equip for a mission. The US Navy provides all medical support to both the US Navy and US Marine Corps (USMC), yet important differences exist in their approaches to ERC. Navy personnel participate in patient movement in challenging environments across the spectrum of Navy and USMC operations. For decades, both the Navy and USMC focused largely on point-of-injury rescue performed by Navy corpsmen trained in search and rescue and initial

Background: Navy Nurses have a role in transporting critically ill and injured patients from austere to more robust surgical facilities, but little is known about their activities or outcomes.

Purpose: To describe a series of patients transported by US Navy nurses during conflicts in Iraq (2005-2006) and Afghanistan (2009).

Methods: Retrospective review of a quality improvement database with descriptive analyses

Most Common ERC Interventions

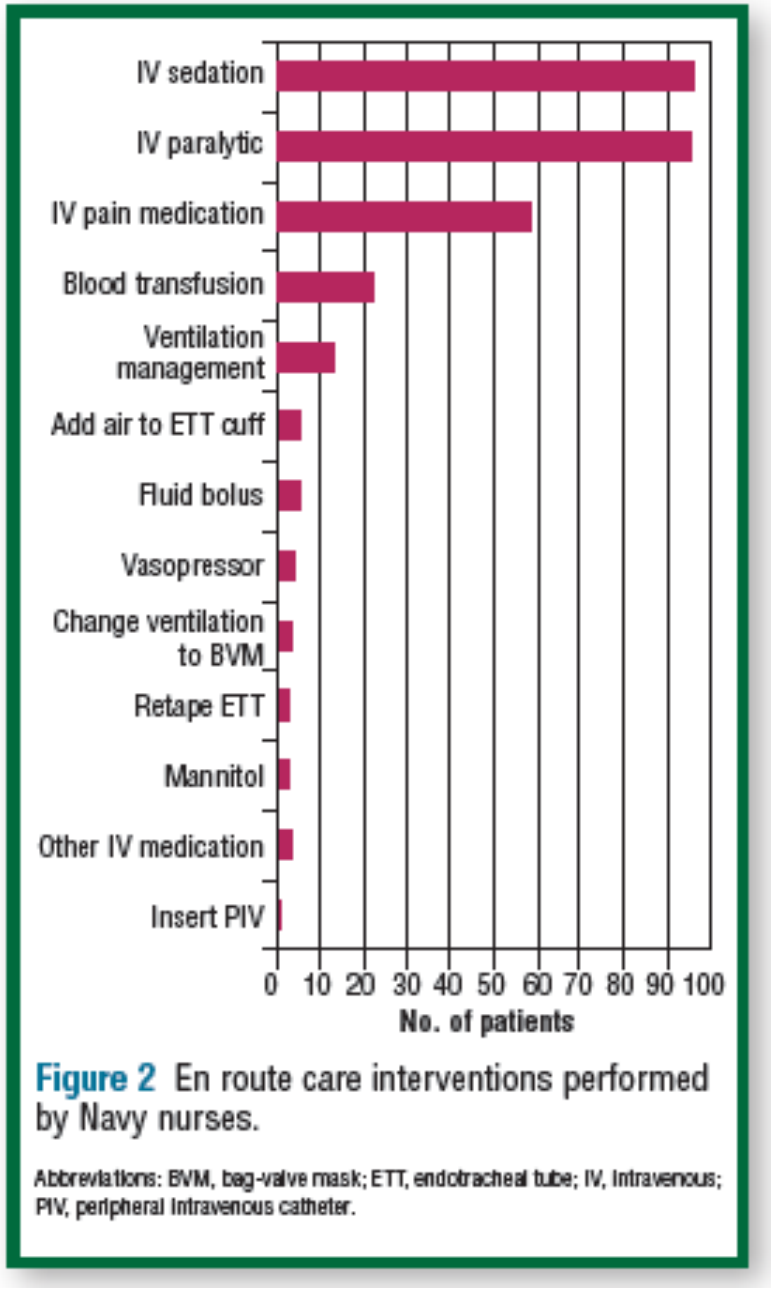

Figure 2 En route care interventions performed by Navy nurses.

Abbreviations: BVM, bag-valve mask; ETT, endotracheal tube; IV, intravenous; PIV, peripheral intravenous catheter.

NO TCCC Interventions

RESULTS:

- 2 deployments; 1 Iraq, 1 Afghanistan
- 630 of 1550 casualties needed MEDEVAC; 46% with critical care ERC
- All patients survived
- Minimal data available

Military En Route Care Training for Evacuation of Casualties within a Complex System of Systems: Needs Assessment, Gap Analysis, and Next-Generation Learning Environments.

- Research led by Col Marla De Jong, USAF (PhD, RN)
- Multi-disciplinary, tri-service team

SPECIFIC AIMS:

1. To systematically assess, describe, and evaluate the features and characteristics of current Navy, Army, and Air Force ERC training courses.
2. To describe and evaluate how each type of ERC clinician is trained and used in the combat environment.
3. To develop recommendations for a Joint ERC Continuum of Care Training System of Systems.

Methods

- Curriculum review and comparison to identify curricular strengths & training gaps
- Semi-structured, 1 hour stakeholder interviews with inductive coding and analysis
- Reviewed DoDTR data for combat casualties who were medically evacuated by air, land, or sea at least once.

Air Force

https://www.wpafb.af.mil/News/Article-Display/Article/1481186/care-in-the-air-teams-deliver-patient-care-in-challenging-environments/

Navy

https://www.dvidshub.net/image/2705789/160703-n-ve959-046

Army

https://www.dvidshub.net/image/1462496/dustoff-wings-life

Results:

- Evaluated 15 ERC courses
- interviewed 74 ERC stakeholders: Army (34%), Navy (20%), or Air Force (45%), or federal employees (1%)
- Reviewed DoDTR data for 16,244 combat casualties who were medically evacuated by air, land, or sea at least once.
- Summarized 15 ERC courses
- Identified 18 aggregated gaps and 16 aggregated recommendations based on the ERC Stakeholder interviews, and summarized DoDTR data.

Aggregated, Prioritized Gaps:

- Lack of an en route care (ERC) strategic leadership plan.
- **Standards for ERC training** are lacking.
- Our readiness to respond to future military engagements is severely hampered by limited training dollars for ERC, including limited funding for Reservists and the National Guard.
- There is no sustained system that keeps instructors in ERC in place or refreshes them.
- Doctrine keeps ERC from moving forward by creating barriers to efficiently modify curricula and training.
- ERC is and will continue to have an enormous "brain drain" of experienced and knowledgeable ERC personnel, leaving the military vulnerable.
- Data from the field are not systematically fed back into ERC to update training.
- ERC providers do not understand each other's roles in ERC nor each other's terminology.

Aggregated, Prioritized Gaps:

- ERC curricula and student assessments are outdated.
- Training does not exist for prolonged field care, acuity of wartime injuries, or patient management.
- JIT (Just in Time)/OJT (On-the-Job Training) Recertification Training is insufficient for medical readiness in ERC.
- Sustainment training is not provided, required or supported.
- Instructional skills and instructional methods are classroom and PowerPoint centric.
- Simulation training is lauded but it is inconsistently implemented and overly relies on the quality of the instructor rather than on protocols for building scenarios and debriefing.
- There are also problems inherent in practicing with a mannequin compared to working with a live patient.
- Patient handoff and patient packaging puts the wounded at risk.
- The ERC research portfolio is very thin.

Aggregated, Prioritized Recommendations:

- Create an Education and Training directorate to increase agility across the branches.
- Set the framework to train en route care (ERC) personnel to a higher level.
- Create an off ramp out of the world back to the field.
- Rethink how rapid updates can be made to the ERC curricula.
- Standardize training and clinical care across military branches.
- Train jointly.
- Update teaching modalities, including providing opportunities to do direct patient care.
- Prepare ERC training curricula for a new kind of war.

Aggregated, Prioritized Recommendations:

- Ensure the best instructors.
- Train in new areas in clinical care and **bolster deficient training.**
- Re-examine how ERC skills are assessed.
- Assure skill sustainment training.
- Close the gap with **patient handoff**.
- Develop a standardized curriculum for **high-quality sustainment training** across the Department of Defense.
- Make paramedic certification mandatory.
- Make **data collection** strategic, specific, and required.

Review of Procedures in ERC

- 95.7% of procedures were performed en route PRIOR to a Role III Facility (“Prehospital”)
- 4.3% of procedures were performed en route to Role IV or V facilities (CCAT)
- 22% of cases – **NO DOCUMENTATION of the ERC team** – unable to tell who provided care

Additional Recommendations

- Need for DoD commitment to and formal training in interprofessional education for EXISTING ERC Personnel, **TRAINERS**, and new ERC trainees
- TeamSTEPPS, Crew Resource Management are good foundations for skills

What does interprofessional collaboration look like?

Many things!

Joint Trauma System Committees on Trauma

- Collaborate with Tri-Service Nursing Colleagues through TSNRP
- Build partnerships with civilian academic centers and research organizations
- Leverage Joint Trauma System and larger DoD organizations

https://jts.amedd.army.mil/

https://jts.amedd.army.mil/index.cfm/committees/cotccc

https://jts.amedd.army.mil/index.cfm/committees/coerccc

https://jts.amedd.army.mil/index.cfm/committees/cosccc

JTS Committees

- Nurses on Committees on En Route and Surgical Combat Casualty Care
- Recently published a “Top 10 List” of Surgical Combat Casualty Care RESEARCH PRIORITIES
- Similar list published for TCCC and En Route Care – goal is to help guide priorities for funding of new research

SPECIAL REPORT FROM MILITARY TRAUMA SYSTEM

The “Top 10” research and development priorities for battlefield surgical care: Results from the Committee on Surgical Combat Casualty Care research gap analysis

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BACKGROUND: The US Military has achieved the highest casualty survival rates in its history. However, there remain multiple areas in combat trauma that present challenges to the delivery of high-quality and effective trauma care. Previous work has identified research priorities for pre-hospital care, but there has been no similar analysis for forward surgical care.

METHODS: A list of critical “focus areas” was developed by the Committee on Surgical Combat Casualty Care (CoSCCC). Individual topics were solicited and mapped to appropriate focus areas by group consensus and review of Eastern Association for the Surgery of Trauma (EAST) and Joint Trauma System guidelines. A web-based survey was distributed to the CoSCCC and the military committees of EAST and the American Association for the Surgery of Trauma. Topics were rated on a Likert scale from 1 (low) to 10 (high priority). Descriptives, univariate statistics, and inter-rater correlation analysis was performed.

RESULTS: A total of 64 responses. The majority of respondents were military (80%) versus civilians (10%). There was moderate to high agreement (inter-rater correlation coefficient = 0.95, $p < 0.0$) for 10 focus areas. The top five focus areas were Personnel/Staffing (mean, 8.03), Resuscitation and Hemorrhage Management (7.69), Pain/Sedation/Anxiety Management (6.96), Operative Interventions (6.9), and Initial Evaluation (6.9). The “Top 10” research priorities included four in Personnel/Staffing, four in Resuscitation/Hemorrhage Management, and three in Operative Interventions. A complete list of the topics/scores will be presented.

CONCLUSIONS: This is the first objective ranking of research priorities for combat trauma care. The “Top 10” priorities were all from three focus areas, supporting prioritization of personnel/staffing of austere teams, resuscitation/hemorrhage control, and damage-control interventions. This data will help guide Department of Defense research programs and new areas for prioritized funding of both military and civilian researchers. (*J Trauma Acute Care Surg.* 2019;87: S14–S21. Copyright © 2019 Wolters Kluwer Health, Inc. All rights reserved.)

LEVEL OF EVIDENCE: Study design, level IV.

KEY WORDS: Combat casualty care; battlefield; forward surgical care; trauma; research; research gaps.

The recent conflicts in Afghanistan and Iraq have seen the United States Military achieve the highest casualty survival rates in its history.[1–3] However, there remain multiple areas in battlefield trauma care that lack high-quality evidentiary support or that present significant obstacles to the delivery of high-quality and highly effective trauma care. The organization and areas of responsibility in modern U.S. battlefield care can roughly be grouped into three categories—(1) point of injury and pre-hospital care, (2) care during transport to a medical treatment facility (en-route care), and (3) forward surgical care. Although the overall goal of this system is to provide seamless care along the spectrum from injury to medical evacuation out of the combat zone, each of these areas has unique capabilities, challenges, and needs to deliver optimal care.[4–6] Addressing these areas of knowledge-deficit or suboptimal capabilities has been a core focus of multiple government-funded research and development programs, such as the Combat Casualty Care Research Program (CCCRP).[7–10] To optimally target and then fund research projects to address these existing “research gaps,” a system for reliably identifying, characterizing, and prioritizing them must be used.[11–13] Arguably the most important organizational advance during this most recent combat experience has been the establishment of the Joint Trauma System (JTS), which performs broad process and quality improvement initiatives, maintains the Department of Defense Trauma Registry (DODTR), and supports the CCCRP in helping to identify key research and development priorities. As a critical component of these activities, the JTS has established three committees with areas of focus and responsibility that correspond to the three phases of care outlines above (pre-hospital, en-route care, and forward surgical care). The earliest

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From the Research Sub-Committee, Committee on Surgical Combat Casualty Care, Joint Trauma System, San Antonio, Texas.

Disclaimer: The opinions expressed in this paper are those of the authors and do not represent the opinion or official policy of the Joint Trauma System, any branch of the U.S. Armed Forces, or the Department of Defense.

This paper was presented at the 2018 Military Health Scientific Research Symposium, Orlando, Florida August 20–23, 2018.

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WHY IT MATTERS:

- Critical to have the NURSING voice at the table!
- We bring something unique to the care of the patient and development of the system
  - Holistic, patient-family centered, flexible, INTERDISCIPLINARY, accustomed to working on TEAMS,
  - Clinical experiences in a wide variety of settings
  - Masters of asking “WHY?”
- To help shape the FUTURE of how military health care is imagined, developed, trained, and delivered military nurses must be part of the process

ONGOING PROJECT

Evaluating Navy Trauma Training

- Project developed by two Navy Clinical Nurse Specialists* at the Navy's Trauma Training Center at Los Angeles County/USC Medical Center

BACKGROUND: the Navy has had a military-civilian trauma training partnership for nearly 20 years. Many personnel - Physicians, PAs, Nurses, Corpsmen – have completed it; some say it was great and prepared them for deployment, others felt it was unhelpful. No systematic evaluation of outcomes had been completed.

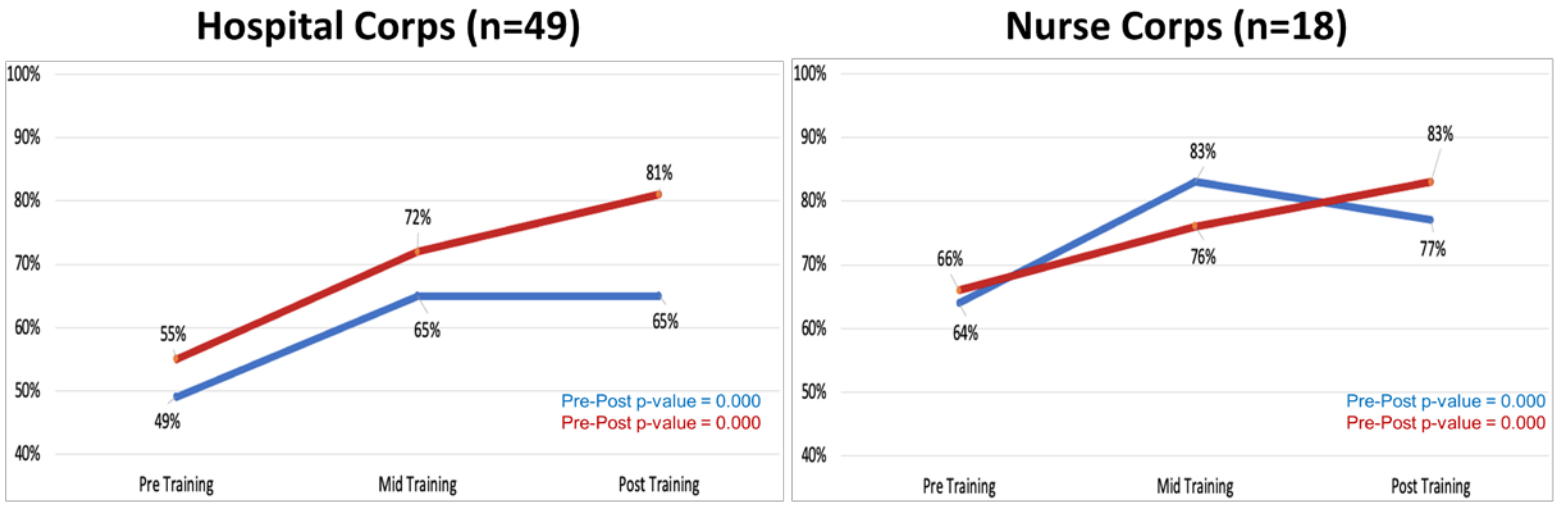
Project developed by CDR Tony Torres and CDR Jamie Stakley, NC USN, funded by TSNRP and implemented with support from the NTTC staff and Geneva Foundation.

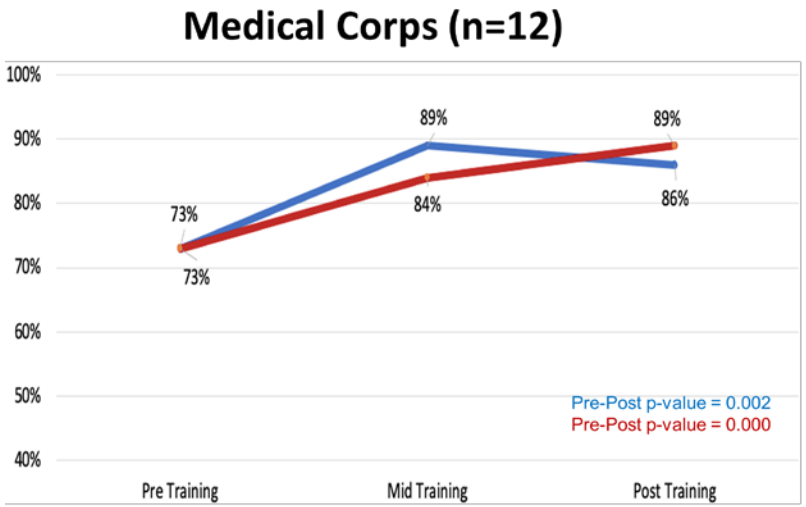
Goals & Methods:

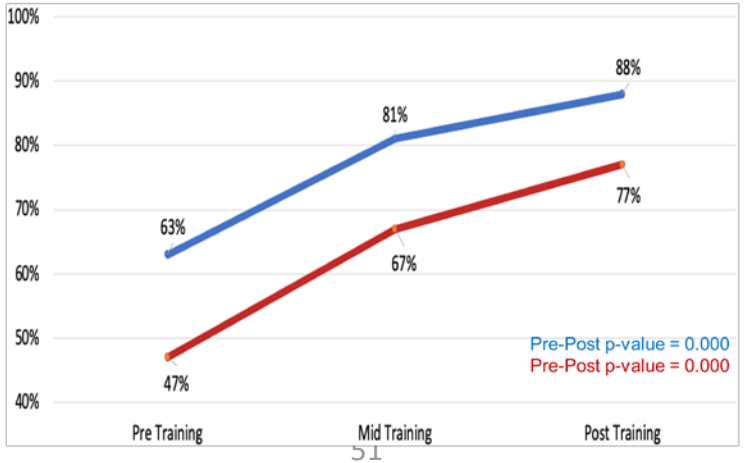
Of this ongoing, TSNRP-funded and IRB approved study:

- To evaluate the knowledge, confidence, and stress of participants that attend the Navy Trauma Training Center (NTTC) at baseline, mid-point, end of training, 3- and 9- months post-training and evaluate changes over time
- Quantify and describe the hands-on clinical experiences of NTTC participants in the mil-civ partnership
- Using high-fidelity simulation, evaluate NTTC participants' performance of complex casualty care at baseline, mid-point, and end of NTTC training – an ongoing sub-study which I will not discuss today.

Preliminary findings:







- Presented at professional meetings (TSNRP and Military Health System Research Symposium, MHSRS)
- Knowledge (blue) and Confidence (red) improved for all groups, but relationships were inconsistent
- Stress was low and stable over time

Clinical Experience Logs

- Need for self-reported data is essential because transient personnel do not document in medical record
- 46 Total personnel enrolled in first 3 cohorts; Number of logs per person ranged from 1-31, mean of 8
- Completion rates varied by cohort and by clinical role
- Highest acuity patients were reflected in 39% of ED logs, 21% of ICU logs, and 61% of OR logs.
- Participant documentation is 2-3 minutes per log, estimated as 20 minutes per shift
- Data entry time is 3-4 minutes per log; automation (i.e., an app) is needed to minimize data entry and analysis burden and enable real-time tracking and feedback to learners

Our Heritage:

- Florence Nightingale went to Scutari to care for the wounded, ill, and injured
- She kept careful notes
- She transformed the environment, and by ongoing, deliberate evaluation of outcome data, demonstrated the difference made by skilled nursing care
- Miss Nightingale was a **PROLIFIC WRITER** – and presented her DATA to the world in order to bring about change

Our Present:

- Innovating and adapting based on existing knowledge and theory to provide best possible care and response during the COVID-19 pandemic
- We need (like Florence!) to keep careful notes! The documentation of nursing interventions and their outcomes is essential to identify what REALLY works, and what does not add value, or causes harm
- Working in interprofessional teams enables greater success

Our Future:

- We will need to conduct rigorous analyses (retrospective studies) of interventions at the individual, community, and population levels to evaluate their effectiveness
- We will need prospective research with strong designs to more definitively evaluate the optimal interventions to fight COVID-19 and other future threats

Key Take Aways

- Documentation is critical to evaluate the effectiveness of nursing care both for the individual patient and for research
- Research shows that documentation of pain assessment and treatment are possible, even in chaotic combat environments
- Research helps to answer clinical as well as policy and education questions
- Prospective studies using simulation are one valuable way to compare effectiveness of education and training programs to determine needed duration, intensity, and fidelity of simulation
- Research is NOT all “pain and trauma” – it is the way to systematically build knowledge, and helps to form the basis of professional nursing care
- Participating in research builds new skills, partnerships and collaborations, can be fun!

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