Pain and Trauma: A Foray into Military Nursing Research

DHA Celebration of the Year of the Nurse and Midwife

 Uniformed Services University
Virginia Blackman, PhD, RN, CNS, CCNS

Captain, Nurse Corps, United States Navy
Specialty Leader for Nursing Research, US Navy
Senior Service Advisor to the Dean
Assistant Professor, Daniel K. Inouye Graduate School of Nursing
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- 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
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.
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?
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)
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
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

Pain Assessments

N= 3,317 total records
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
FOCUS ON PAIN MANAGEMENT

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

Virginia Schuberg, FNP-BC, RN, Corie A. Cooper, MA, Kathleen Kunkle, RN,
Tatyana Post, RN, and Michael D. Rausch, MD

ABSTRACT

Background: Previous reports have suggested a higher prevalence of preexisting pain in military service members than in the general population, which is believed to be an important factor in patient satisfaction with care and the rate of chronic pain development.

Aim: We sought to determine the prevalence and predictors of preexisting pain assessment and analgesic use in military trauma patients.

Methods: This was a retrospective study of trauma patients seen at the United States Army Medical Research Institute of Chemical Defense (USAMRICD) Edgewood Area (EABW) from July 2010 to December 2013.

Results: Of the 1324 patients evaluated, 1063 (80.4%) were assessed for preexisting pain. The prevalence of preexisting pain was 48.8%. The most common causes of preexisting pain were musculoskeletal (22.2%), orthopedic (13.4%), and neurologic (10.2%). The use of analgesics was associated with a higher prevalence of preexisting pain (p < 0.001).

Conclusion: The prevalence of preexisting pain in military trauma patients is high, and its assessment should be a routine part of trauma care to ensure effective pain management.

Keywords: Preexisting pain, trauma patients, military, analgesic use

INTRODUCTION

Preexisting pain is a common complaint in patients who present to the emergency department for evaluation and treatment. It is often underdiagnosed and undertreated in the acute setting, leading to increased pain, disability, and reduced quality of life. The prevalence of preexisting pain in the general population is estimated to be between 5% and 30%, and it is believed to be higher in military service members due to the high incidence of musculoskeletal injuries and chronic pain conditions.

METHODS

This was a retrospective study of trauma patients seen at the United States Army Medical Research Institute of Chemical Defense (USAMRICD) Edgewood Area (EABW) from July 2010 to December 2013. The study included all patients who presented to the ED with a primary diagnosis of trauma and were admitted to the hospital for further evaluation and treatment.

RESULTS

Of the 1324 patients evaluated, 1063 (80.4%) were assessed for preexisting pain. The prevalence of preexisting pain was 48.8%. The most common causes of preexisting pain were musculoskeletal (22.2%), orthopedic (13.4%), and neurologic (10.2%). The use of analgesics was associated with a higher prevalence of preexisting pain (p < 0.001).

CONCLUSION

The prevalence of preexisting pain in military trauma patients is high, and its assessment should be a routine part of trauma care to ensure effective pain management. Further research is needed to determine the long-term impact of preexisting pain on patient outcomes and to develop strategies to improve pain management in this population.
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

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

<table>
<thead>
<tr>
<th>TQ</th>
<th>Application</th>
<th>ERC RNs</th>
<th>SMTs</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Performed</td>
<td>60%</td>
<td>72%</td>
<td>0.31</td>
</tr>
<tr>
<td></td>
<td>Accurately</td>
<td>39%</td>
<td>86%</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Blood</th>
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<th>ERC RNs</th>
<th>SMTs</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Performed</td>
<td>79%</td>
<td>17%</td>
<td>&lt;0.05</td>
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</table>

Limitation: multiple uses of “PRBC” bag prevented accuracy testing.

<table>
<thead>
<tr>
<th>Needle-D</th>
<th>Needle Decompression</th>
<th>ERC RNs</th>
<th>SMTs</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Performed</td>
<td>79%</td>
<td>33%</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td></td>
<td>Accurately</td>
<td>83%</td>
<td>79%</td>
<td>0.31</td>
</tr>
</tbody>
</table>
## Secondary Results

### Pre-Transfer & Pain Assessment

<table>
<thead>
<tr>
<th></th>
<th>ERC RN</th>
<th>SMT</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expose Patient</td>
<td>48%</td>
<td>59%</td>
<td>0.43</td>
</tr>
<tr>
<td>Vent Settings?</td>
<td>24%</td>
<td>31%</td>
<td>0.55</td>
</tr>
<tr>
<td>Full O2 Tank?</td>
<td>21%</td>
<td>28%</td>
<td>0.54</td>
</tr>
<tr>
<td>IV Patency?</td>
<td>24%</td>
<td>21%</td>
<td>0.15</td>
</tr>
<tr>
<td>Give Analgesic</td>
<td>24%</td>
<td>10%</td>
<td>0.15</td>
</tr>
</tbody>
</table>

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

## Handoff

<table>
<thead>
<tr>
<th></th>
<th>ERC Nurses</th>
<th>SMTs</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Patient History</td>
<td>84%</td>
<td>87%</td>
<td>1.0</td>
</tr>
<tr>
<td>Current Assessment</td>
<td>91%</td>
<td>71%</td>
<td>0.09</td>
</tr>
<tr>
<td>Medications Administered</td>
<td>71%</td>
<td>39%</td>
<td>0.03</td>
</tr>
<tr>
<td>Interventions Performed</td>
<td>97%</td>
<td>88%</td>
<td>0.32</td>
</tr>
</tbody>
</table>

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

**Implications**

**IMPROVEMENTS IN INITIAL AND SUSTAINMENT TRAINING NEEDED**
What happened?

- 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
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.
RESULTS:

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

- 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

Navy

Army


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

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


References


References


Torres, T; Stakley, J. Stotts, N.A., Blackman, V.S. (2018). *Assessment of trauma knowledge, skills & attitudes at Navy Trauma Training Center*. Tri-Service Nursing Research Program (TSNRP), San Antonio, TX.
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   b. If you have not previously used the CEPO CMS click register to create a new account.
4. Follow the onscreen prompts to complete the post-activity assessments:
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   b. Complete the Evaluation
   c. Take the Posttest
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