

Operational Healthcare: Ready to Care for Our Warriors

Funding

TriService Nursing Research Program

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Study Team

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Background

- Events of September 11 and continuing military operations reinforce the need to be ready
- Unique characteristics of casualties
 - Bomb blast injuries
 - Gunshot wounds
 - Severe blunt trauma
 - Burns
- More than 87% of USAF facilities have < 100 inpatient beds
- One Level 1 trauma center in the Air Force (Wilford Hall)
- Only 3 AF medical facilities with > 100 inpatient beds
- 48% of AF bedded facilities with < 10 inpatient beds
- Previous research conducted at Wilford Hall has identified the usefulness of simulation to evaluate clinical readiness. Unclear if these results are generalizable to the rest of the Air Force.

Purpose

Replicate a study performed at Wilford Hall Medical Center at an Air Force community sized hospital (44 inpatient medical-surgical beds) to determine if an educational intervention using human patient simulation improves the readiness of Air Force medical-surgical nurses

Study Questions

Differences between control and experimental groups in the following variables between baseline and one-month post intervention

- Simulation lab performance
- Cognitive exam
- Self-assessment of ability to provide care for various types of patients (e.g. orthopedic, neurological, burn)

Experimental Group: Differences between baseline and immediate post-intervention and between immediate post-intervention and 30-day post-intervention scores

- Simulation lab performance
- Cognitive exam (subset of questions affected by intervention)

Methods

- Randomized control trial (repeated measures)
- 40 medical-surgical nurses randomized to control or experimental groups
 - Control Group: Baseline/30-Day Evaluation
 - Experimental Group: Baseline/3-hour training/Post-training evaluation/30-day evaluation
- Intervention focused on critical thinking skills and nursing competencies
- Outcomes
 - Simulation lab performance on 4 scenarios evaluated using categorical classification (Go/No Go Checklist)
 - Self-assessment of competency to manage the care scenarios
 - No Go (Novice/Advanced beginner)
 - Go (Competent/Proficient/Expert)
 - 117-item validated cognitive exam

Intervention

Scenarios Based on Most Frequent Battle Injuries (replication of WHMC scenarios)

- **Anaphylactic Shock**
 - Airway Management
- **Complicated Orthopedic Injuries**
 - Cervical Spine/Head Injury
- **Bomb Blast Injuries**
 - Hemorrhagic Shock
- **Burns/Inhalation Injuries**



Capt Patt

Ankle-Head Man



BASELINE

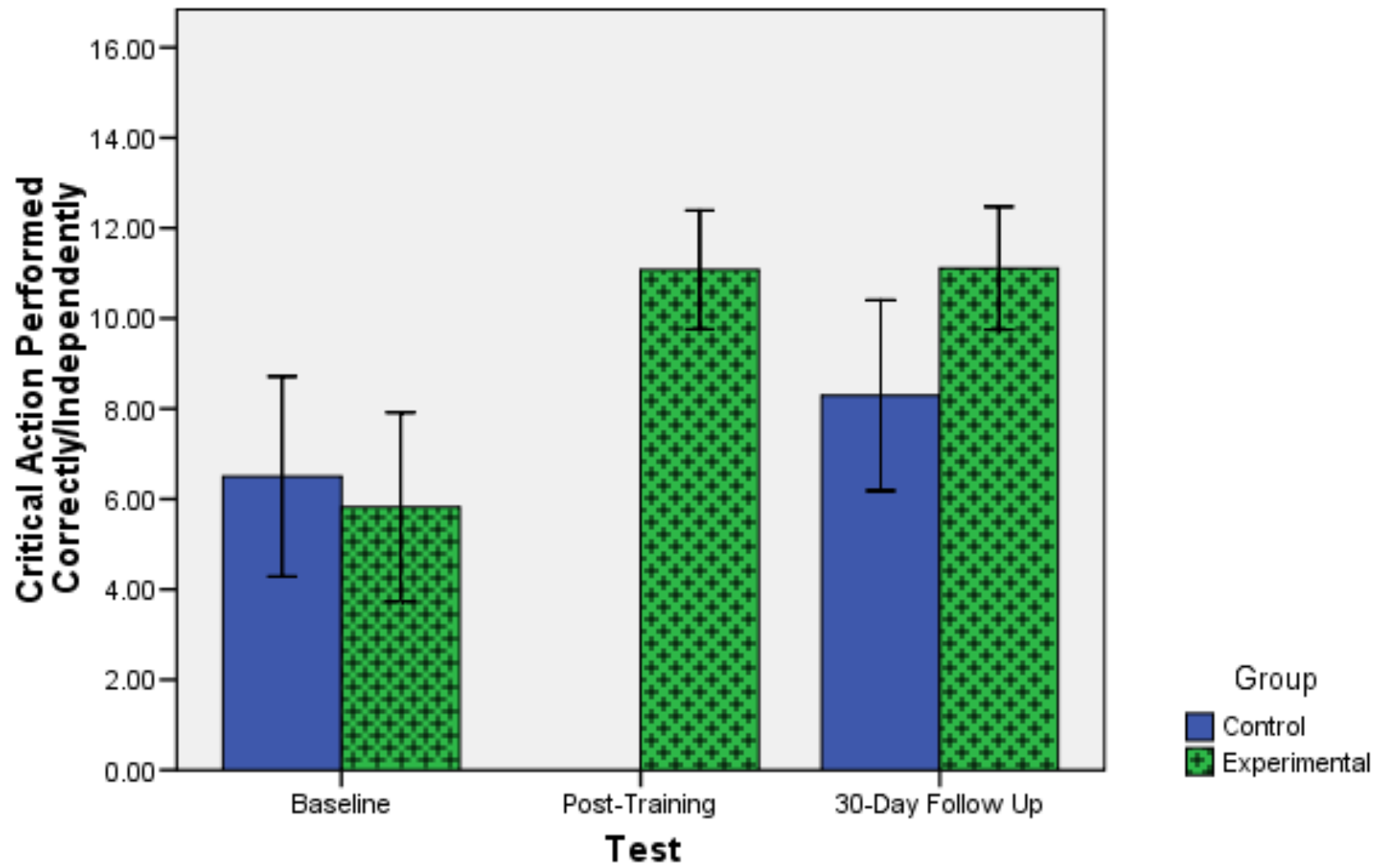
(Orthopedic Injury/Head Injury)

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Self-Assessment (Go): Orthopedic (57%)/Neurological (45%)

Action	Percentage
Detect Pulseless Foot	43%
Corrective Action (orthopedic injury)	
→ Unwrap dressing	40%
→ Recheck pulse	37%
→ Correctly reapply splint	29%
Prioritize care – Head Trauma	60%
Recognize s/sxs ↑ICP	
→ Neuro check	22%
→ Orientation	37%
→ Agitation	9%
→ PERRL	51%
Prioritize care C-spine injury	54%
Maintain C-spine control	41%

Ankle-Head Injury



Error Bars: 95% CI

30-DAY FOLLOWUP: ANKLE-HEAD MAN Perform Correctly/Independently (GO)

Action	Control	Experimental	p
Self-Assessment	68%	90%	.004
•Orthopedic Injury			
•Neurological Injury			
Detect Pulseless Foot	71%	100%	.000
Corrective Action (ortho)			
→Unwrap dressing	65%	89%	.002
→Recheck pulse	65%	77%	NS
→Correctly reapply splint	53%	78%	NS
Prioritize care – Head Trauma	71%	83%	.035
Recognize s/sxs ↑ICP			
→Neuro check	53%	67%	NS
→Orientation	59%	61%	NS
→Agitation	35%	67%	NS
→PERRL	77%	89%	.007
Prioritize care C-spine injury	44%	78%	NS
Maintain C-spine control	38%	53%	NS

Bomb-Blast Man (Hemorrhage)

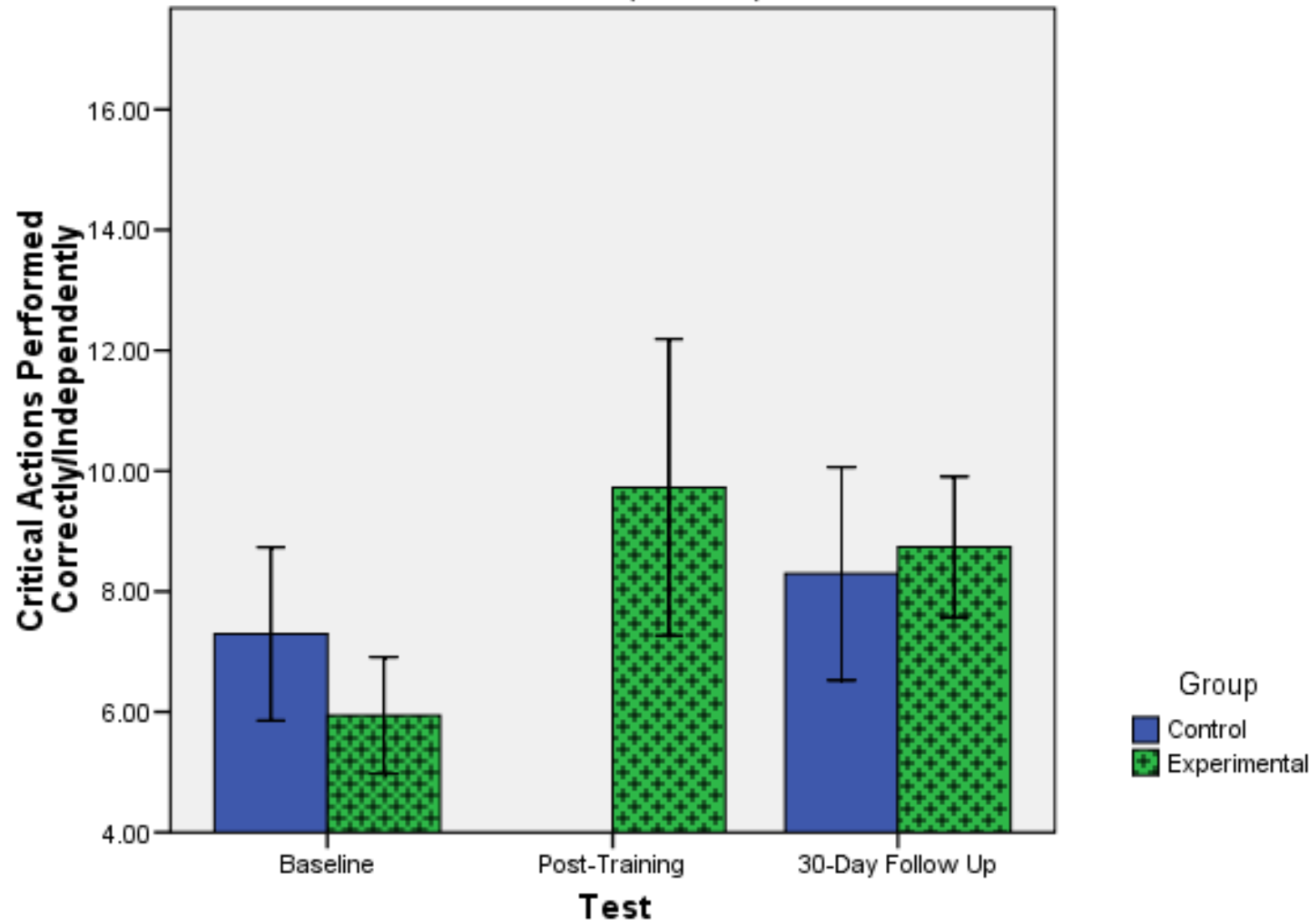


Baseline: Bomb Blast Guy (Femur Fracture/Hemorrhagic Shock)

Self assessment (shock management): 47%

Action	Correct/Independent
Initial assessment - circulation	68%
Identify femur fracture	83%
Use pulse to estimate BP	19%
Prioritize care based on soft tissue/ortho injury	77%
Prioritize care based on possible pulmonary blast injury	15%
Prioritize care based on hemorrhagic shock	50%
Prioritize care based on possible c-spine injury	30%
Initiate fluid resuscitation	84%
Reassess heart/blood pressure	32%
Consider urethral catheter (r/o pelvic fx)	24%
Apply c-collar	24%

Blast Injury (17 Items)



Error Bars: 95% CI

30-Day Follow-Up: Bomb Blast Guy (Femur Fracture/Hemorrhagic Shock)

Action	Control	Experimental	p
Self Assessment (Shock)	54%	84%	.04
Initial assessment - circulation	88%	74%	NS
Identify femur fracture	88%	100%	NS
Use pulse to estimate BP	53%	58%	NS
Prioritize care based on soft tissue/ortho injury	82%	89%	NS
Prioritize care based on possible pulmonary blast injury	23%	16%	NS
Prioritize care based on hemorrhagic shock	65%	68%	NS
Prioritize care based on possible c-spine injury	29%	47%	NS
Initiate fluid resuscitation	11%	21%	NS
Reassess heart/blood pressure	29%	16%	NS
Consider urethral catheter (r/o pelvic fx)	29%	26%	NS
Apply c-collar	35%	73%	.02

Baseline: Burn Man

⚡

Self Assessment (Go): 40%

Action

Correct/Independent

Assess airway/breathing

79%

Assess disability (neurological)

21%

Prevent hypothermia

51%

Prioritize care based on airway

74%

Prioritize care based on carbon monoxide poisoning

6%

Prioritize care based on thermal injury

71%

100% non-rebreather mask

65%

Recognized limitations of SpO2 monitoring with CO

17%

Calculate % BSA burned

25%

Calculate total fluid requirement

7%

Calculate manual drip rate

9%

Burn care

9%

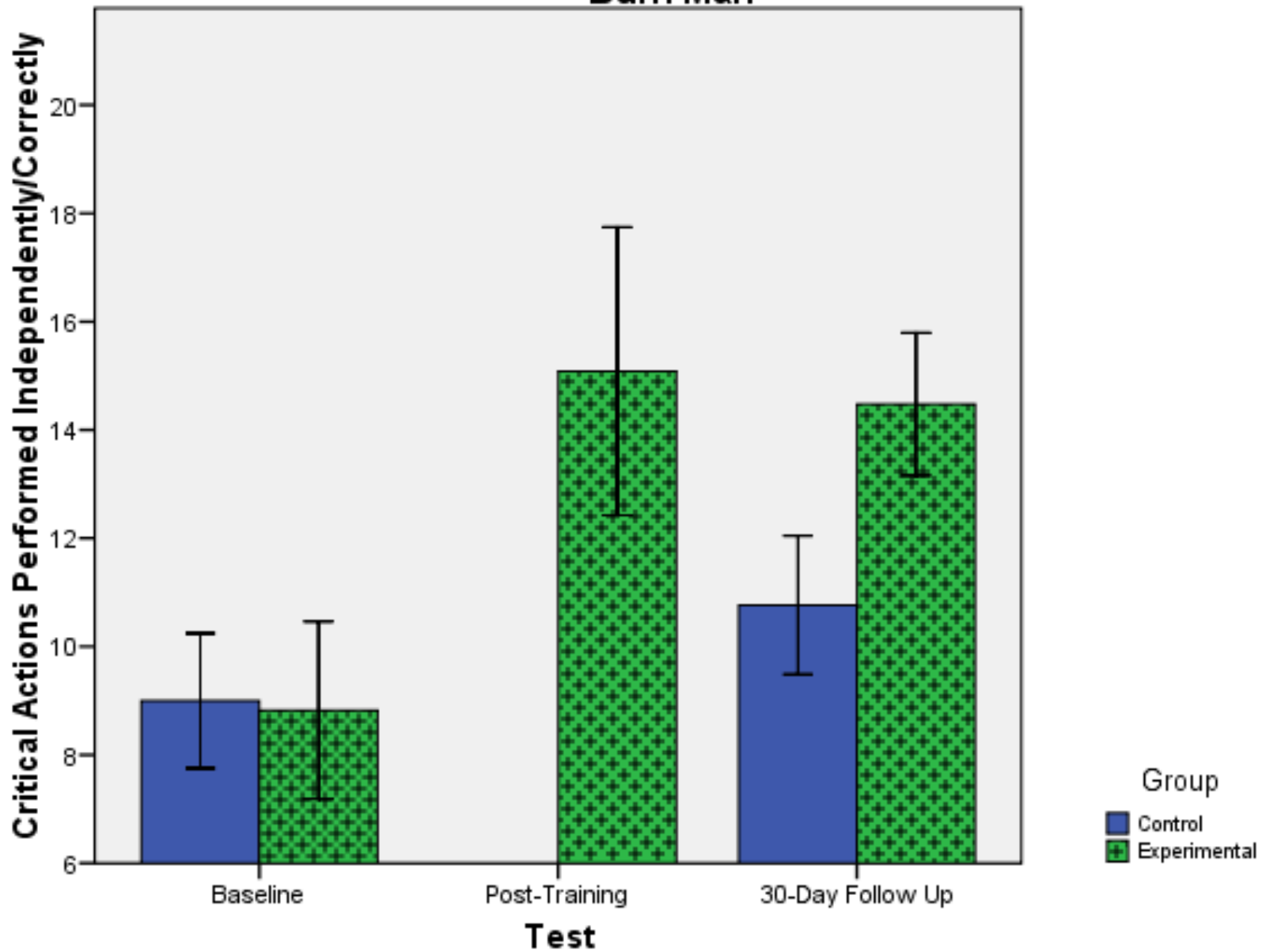
Correctly apply dressing

27%

Pain management

71%

Burn Man



Error Bars: 95% CI

Cognitive Exam

Pain Management

Which of the following is correct regarding patient controlled analgesia (PCA) used in the AOR?

- 15% A. IV PCA may be used in conjunction with a continuous peripheral nerve block
- 33% B. A basal rate should be set for all patients to provide background pain relief
- 35% C. The PCA pump must be discontinued before aeromedical evacuation
- 13% D. Supplemental IV boluses are not appropriate due to risk of overdose

Question

A patient is post-surgery after repairing a penetrating injury to the head. Which of the following is the correct method for deep vein thrombosis prophylaxis for this patient?

5% A. Inferior vena cava filter

3% B. Heparin infusion

50% C. Lovenox or SQ heparin and sequential compression stockings

42% **D. Sequential compression stockings with or without graduated compression stockings**

Items Scoring Highest (30-Day Follow-Up)

→ Management of patient with tourniquet (2 items)	100%
→ Pin Care – External Fixator	98%
→ C-Collar – Log Roll	98%
→ Differential diagnosis – Combat Stress Reaction	98%
→ Signs of myocardial infarction	93%
→ Cause of collapse – cardiac arrhythmia	93%
→ Route of pain medications - intravenous	95%
→ Signs/Symptoms – GI Blast Injury	93%
→ Orthopedic Injury – RICE	93%

Items Scoring Lowest (30-Day Follow-Up)

- Treatment white phosphorus burn 38%
- Field management – TB outbreak 38%
- Preventing hypothermia 38%
- Wound dressing – wet to moist 35%
- Wound vacuum - emergency 33%
- Optimize chest tube drainage on litter 30%
- Wound care – antibiotic beads 23%
- Wound dressing – wet to moist 20%
- Supplemental pain medication - PNB 15%

Does Knowledge Transfer?

Test Item	Control	Experimental
Radial pulse = ? SBP	75% (53%)	80% (58%)
Smoke inhalation – SpO2	50% (17%)	75% (58%)
%BSA Calculation	65% (41%)	100% (84%)
Extremity Dressing	90% (53%)	90% (72%)
Burns – Fluid Resuscitation Calculation	80% (12%)	85% (52%)
Pelvic fracture – urethral catheter	45% (29%)	80% (26%)
Most sensitive neurological indicator	70% (35%)	95% (67%)
C-collar/log rolling	95% (38%)	95% (53%)

*30 Day Follow-Up

Cognitive Assessment

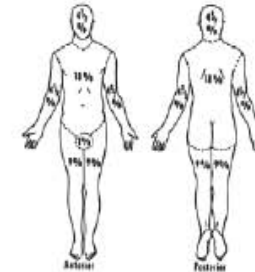
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Level	Cause	Signs & Symptoms	Treatment
Above Glottis	Thermal	<ul style="list-style-type: none"> Pharyngeal burns and soot Hoarseness Stridor Rapid airway obstruction; onset may be delayed until fluid resuscitation is adequate 	<ul style="list-style-type: none"> Give 100% cool, humidified O₂ via non-rebreather mask or ETT, and elevate HOB > 30° Intubate early rather than later with 8 size ETT to facilitate bronchoscopy
Below Glottis	Chemical/Steam	<ul style="list-style-type: none"> Depends on type and amount of substance Bronchospasm Bronchorrhea Low SaO₂ 	<ul style="list-style-type: none"> Give 100% cool, humidified O₂ via non-rebreather mask or ETT, and elevate HOB > 30° Intubate early rather than later with 8 size ETT to facilitate bronchoscopy procedure DECONTAMINATE (prn); protect providers May receive aerosolized heparin 5000 units with albuterol 1.5 mg q4hrs Observe for 24 hours

From American Burn Association, Advanced Burn Life Support Course Instructor Manual (2005), Ch 2, Airway Management and Smoke Inhalation Injury and JTTS Clinical Practice Guidelines for Burn Care (October 2006)

51. C. Each leg is 18%. Note: If the burn does not involve an entire extremity, use a partial percentage (e.g., palm of patient's hand ~ 1%).



- American Burn Association, Advanced Burn Life Support Course (2005)
- Emergency War Surgery, Chapter 28, Burns (2004) http://www.brooksidepress.org/Products/Emergency_War_Surgery/index.htm
- "Burn Facts Poster," United States Army Institute of Surgical Research
- JTTS Clinical Practice Guidelines for Burn Care (October 2006)

52. A. To avoid potential vascular occlusion, a dressing should be started from the most distal aspect and move toward the proximal aspect. The following methods are recommended for dressing an amputation.
Below the knee/Below Elbow/Above Elbow dressing. Follow similar steps for soft dressing (gauze) during initial wound management. Key is to avoid creating a tourniquet effect with the dressing.

Conclusions

Is self-assessment a useful indicator of readiness?	+/-
Is cognitive assessment a useful indicator of readiness?	+/-
Is simulation useful for evaluating clinical readiness?	++
Is simulation useful for enhancing clinical readiness?	+
Is simulation useful for just-in-time training	+

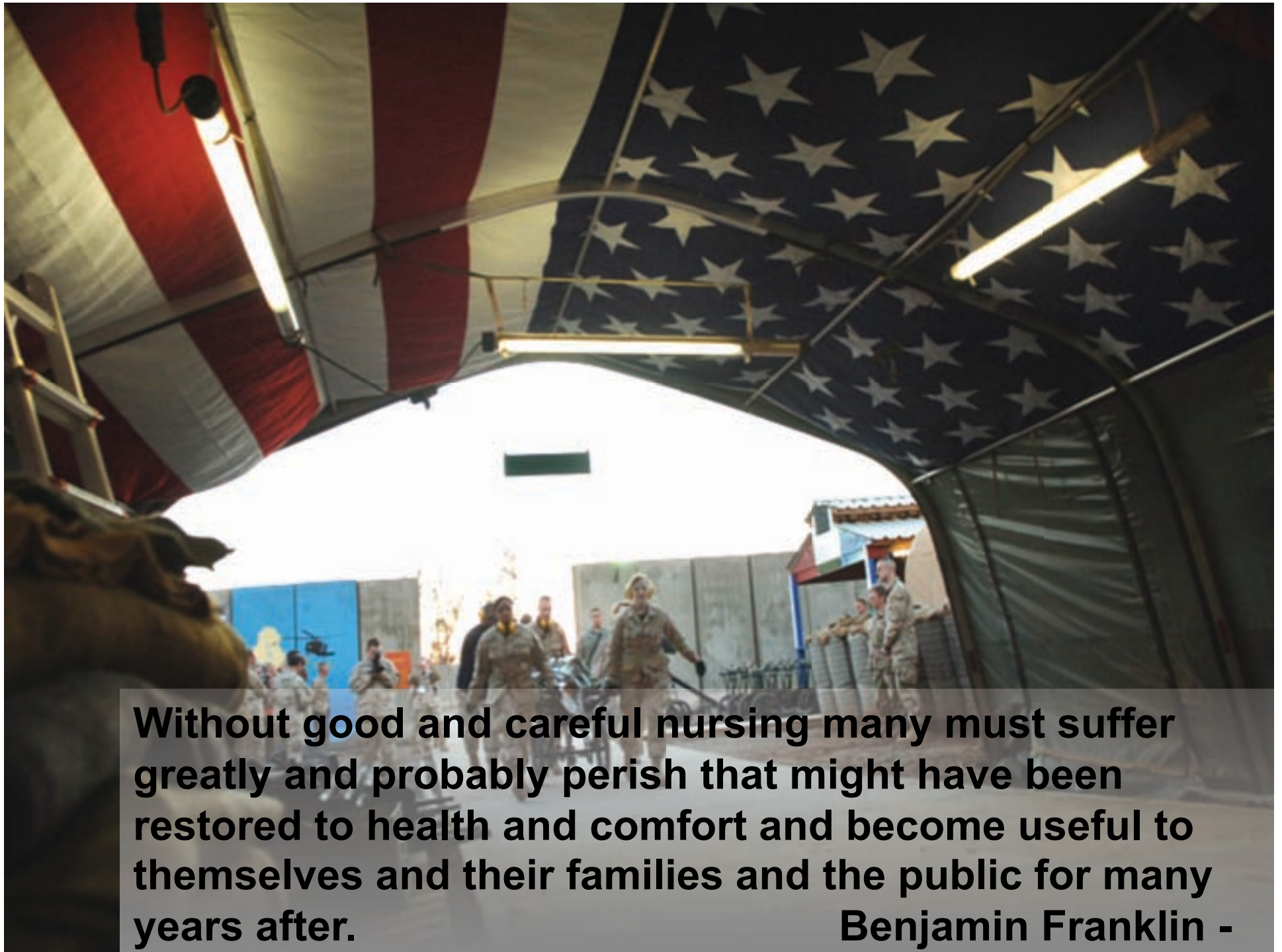
Recommendations for Readiness Training

- TNCC (focus on development of systematic primary/secondary assessment and initiation of therapy)
- Care of casualty with neurological injury
 - Neurological exam (MACE)
 - Cervical collar/spine immobilization
 - Initial management of head trauma
- Orthopedic injuries
 - Splinting
 - Detection of compartment syndrome
- Burns
 - BSA/Fluid Resuscitation
 - Initial management of burn wounds
- Pain Management
 - Basic strategies (combined therapies)
 - Alternative strategies (PCA, PNB)
- Care without technology (BP cuff/IV pump)
- Field infection control
- Soft tissue trauma
 - Evidence-based dressings
 - Wound vacuum
 - Antibiotic beads

Care Within Context

Information severed from thought for action is dead, a mind crushing load

Dewey 1966



Without good and careful nursing many must suffer greatly and probably perish that might have been restored to health and comfort and become useful to themselves and their families and the public for many years after. Benjamin Franklin -

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