Combat Hand Burns: An Unresolved Problem

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Incidence

- Burns account for about 5% of OEF/OIF casualties [1]
- Hands are most frequent OEF/OIF combat-related burn areas of the body [1,2]
  - 80% sustained burns to hands
  - 50% of at risk BSA of hand involved
- Prevalence of hand burns also documented historically [3]

1. Kauvar DS, Wolf SE, Wade CE, et al. Burns sustained in combat explosions in Operations Iraqi and Enduring Freedom. *Burns.* 2006;32:853-857.
2. Kauvar DS, Cancio LC, Wolf SE, et al. Comparison of combat and non-combat burns from ongoing U.S. military operations. *J Surg Res.*2006;132(2):195-200.
3. Eldad A, Torem M. Burns in the Lebanon War 1982: “the blow and the cure”. *Mil Med.* 1990;155:130-132.

Severity

- Functional impairment of hand burns can be substantial [1,4,5]

1. Kauvar DS, Wolf SE, Wade CE, et al. Burns sustained in combat explosions in Operations Iraqi and Enduring Freedom. *Burns.* 2006;32:853-857.
4. van Zuijlen PP, Kreis RW, Vloemans AF, et al. The prognostic factors regarding long-term functional outcome of full-thickness hand burns. *Burns.* 1999;25:709-714.
5. Barillo, DJ, Harvey KD, Hobbs CL, et al. Prospective outcome analysis of a protocol for the surgical and rehabilitative management of burns to the hands. *Plast Reconstr Surg.* 1997;100:1442-1451.

Protection

- Use of protective clothing has been described [3,6-8]

3. Eldad A, Torem M. Burns in the Lebanon War 1982: “the blow and the cure”. *Mil Med.* 1990;155:130-132.
6. Voisine JJ, Albano JP. Reduction and mitigation of thermal injuries: what can be done? *Mil Med.* 1996;161:54-57.
7. Baycar RS, Aker F, Serowski A. Burn casualties in combat: a need for protective garments. *Mil Med.* 1983;148:281-282.
8. Dougherty PJ. Armored vehicle crew casualties. *Mil Med.* 1990;155:417-420.

All Army Activity (ALARACT)

- Dissemination in DEC 2005 to emphasize the use of hand protection [1,9]

Original Message
From: ou:DA PENTAGON TELECOMMUNICATIONS(uc),ou:PTC OPERATIONS(uc)
Sent: Thursday, December 22, 2005 5:34 PM
To: AL ALARACT(uc)
Subject: ALARACT 261/2005

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THIS MESSAGE IS BEING SENT BY THE PENTAGON TELECOMMUNICATIONS CENTER ON BEHALF OF DA WASHINGTON DC//DAMOAOC//

SUBJ: HIGH INCIDENCE OF HAND BURNS

THIS ALARACT MESSAGE IS RELEASED ON BEHALF OF THE OFFICE OF THE SURGEON GENERAL

SUBJ: HIGH INCIDENCE OF HAND BURNS

1 (U) SOLDIERS IN OIF/OEF ARE EXPERIENCING A DISPROPORTIONATE NUMBER OF HAND BURNS IN RELATION TO OTHER BODY PARTS WHICH POTENTIALLY MAY BE REDUCED BY WEARING FIRE RESISTANT NOMEX OR KEVLAR GLOVES. COMMANDERS AND LEADERS AT ALL LEVELS ARE ENCOURAGED TO ENFORCE WEARING OF FIRE RESISTANT GLOVES, PARTICULARLY DURING HIGHRISK ACTIVITIES SUCH AS VEHICLE OPERATIONS, BURNING WASTE, AND HANDLING OF MUNITIONS. SOLDIERS SHOULD WEAR ONLY FIRE RESISTANT GLOVES SUCH AS THOSE ISSUED UNDER THE RAPID FIELDING INITIATIVE (RFI). SOME GLOVES PURCHASED BY SOLDIERS PROVIDE LITTLE OR NO FIRE PROTECTION.

2 (U) DATA FROM THE INSTITUTE OF SURGICAL RESEARCH (ISR) SHOW THAT SEVERE BURNS HAVE INCREASED FROM 11.9 PERCENT AVERAGE BODY SURFACE AREA IN APRIL 2003 TO 16.2 PERCENT IN APRIL 2005. THE MAJORITY OF ALL COMBATRELATED BURNS ARE CAUSED BY EXPLOSIONS (IED, VBIED, RPG, MINES) ON OR NEAR A MILITARY VEHICLE. HAND BURNS OCCUR IN 84 PERCENT OF VEHICLERELATED BURN PATIENTS AND FREQUENTLY LEAD TO SEVERE LONGTERM DISABILITIES.

3 (U) POC FOR THIS MESSAGE IS COL PAUL GAUSE AT PAUL.GAUSE@US.ARMY.MIL, COMM: 7036812707, DSN: 7612707.

4 (U) EXPIRATION DATE CANNOT BE DETERMINED.

1. Kauvar DS, Wolf SE, Wade CE, et al. Burns sustained in combat explosions in Operations Iraqi and Enduring Freedom. *Burns.* 2006;32:853-857.
9. All Army Activity (ALARACT) Message 261/2005. High incidence of hand burns. *Office of the U.S. Army Surgeon General.* 2005;December

Purpose

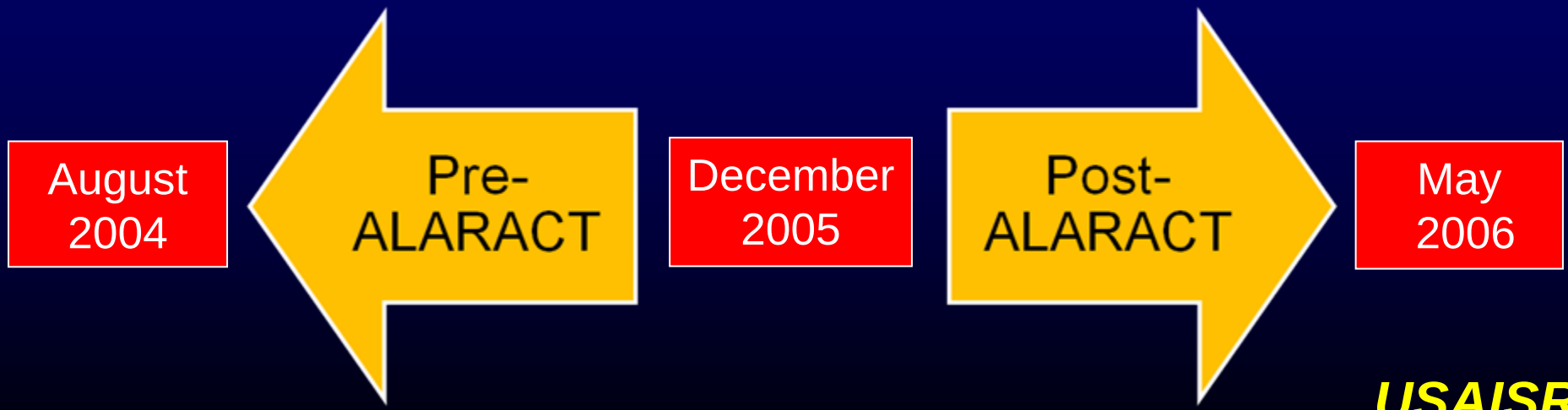
- Assess the effectiveness of the ALARACT and any resulting changes in policy in reducing the incidence and severity of combat-related hand burns sustained in current war operations

Hypothesis

- The incidence and severity of hand burns sustained in OEF/OIF decreased as a result of efforts to increase the use of hand protection.

Methods

- Retrospective review of USAISR Burn Registry for OEF/OIF hand burns 17 months before and after ALARACT
  - AUG 2004 through DEC 2005 (Pre-ALARACT)
  - JAN 2006 to May 2007 (Post-ALARACT)



Data Collection

- Data included:
  - % TBSA
  - % FT TBSA
  - % Hand TBSA
  - Depth of hand burn
  - % Hand TBSA : Total TBSA

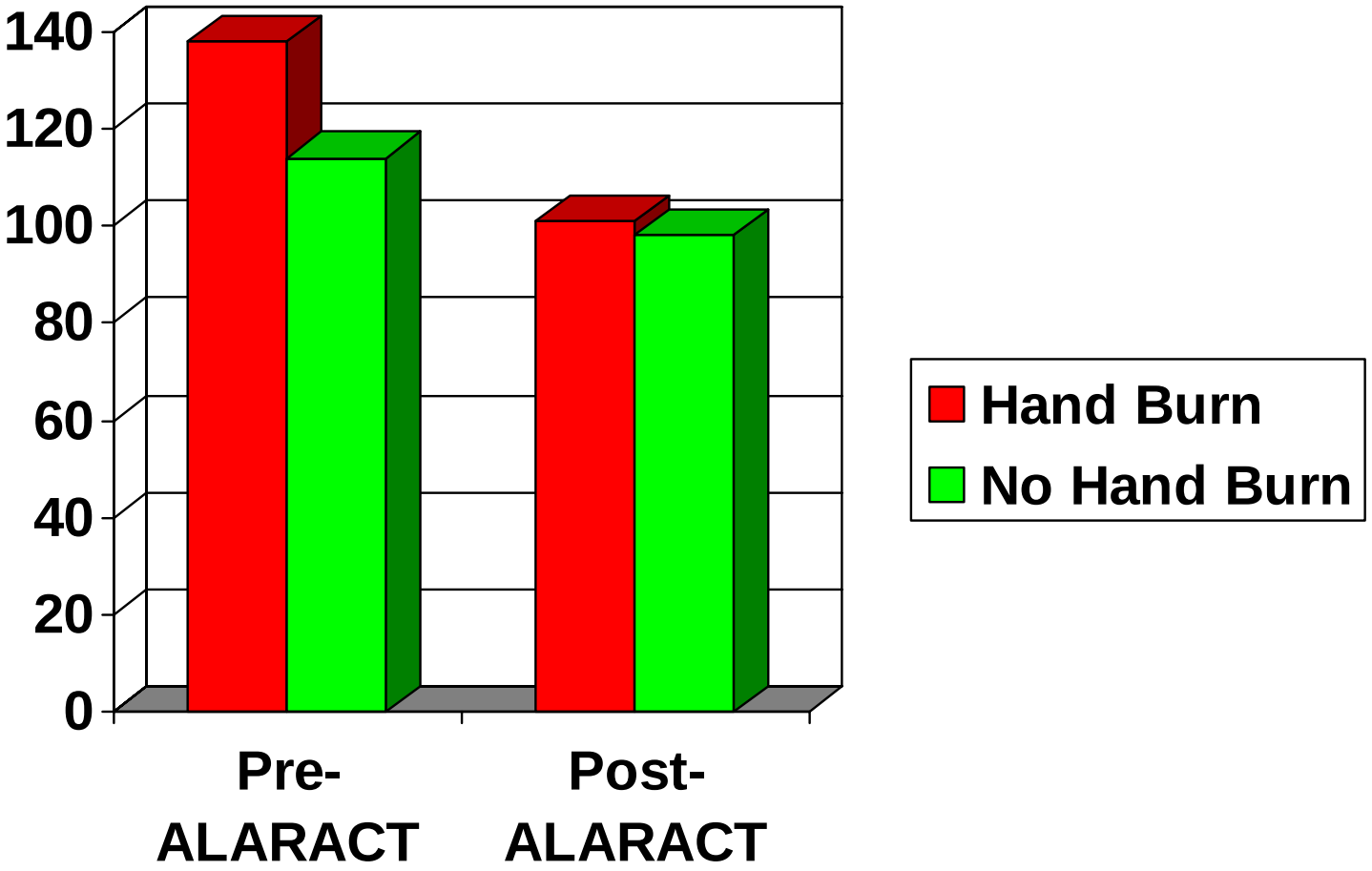
- Statistical Analysis conducted by Mann-Whitney U

Descriptive Results

451 Total Patients

- **Hand Burn 239 (52.9%)**
  - **Pre-ALARACT 138 (57.7%)**
  - **Post-ALARACT 101 (42.3%)**
- **No Hand Burn 212 (47.1%)**
  - **Pre-ALARACT 114 (53.7%)**
  - **Post-ALARACT 98 (46.3%)**

Incidence Results



Mean Overall TBSA

Timeline	N	Incidence HB	Mean TBSA (SD)	Mean FT (SD)	Mean HB BSA (SD)	Mean HBPT (SD)	Mean HBFT (SD)	Mean HB:TBSA (SD)
Pre-ALARACT	138	53.7%	* **21.5% (23.1)**	14.5% (22.3)	3.2 % (1.4)	1.4% (1.3)	1.8% (2.1)	36% (29.4)
Post-ALARACT	101	52.1%	* **28.8% (24.8)**	21.9% (24.6)	3.2% (1.5)	1.2% (1.4)	1.9% (1.9)	25% (26.7)

*P < 0.05

Mean Full-Thickness

Timeline	N	Incidence HB	Mean TBSA (SD)	Mean FT (SD)	Mean HB BSA (SD)	Mean HBPT (SD)	Mean HBFT (SD)	Mean HB:TBSA (SD)
Pre-ALARACT	138	53.7%	21.5% (23.1)	* **14.5% (22.3)**	3.2 % (1.4)	1.4% (1.3)	1.8% (2.1)	36% (29.4)
Post-ALARACT	101	52.1%	28.8% (24.8)	* **21.9% (24.6)**	3.2% (1.5)	1.2% (1.4)	1.9% (1.9)	25% (26.7)

*P < 0.05

Mean %HB:%TBSA

Timeline	N	Incidence HB	Mean TBSA (SD)	Mean FT (SD)	Mean HB BSA (SD)	Mean HBPT (SD)	Mean HBFT (SD)	Mean HB:TBSA (SD)
Pre-ALARACT	138	53.7%	21.5% (23.1)	14.5% (22.3)	3.2 % (1.4)	1.4% (1.3)	1.8% (2.1)	* **36% (29.4)**
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*P < 0.05

Discussion

- Incidence & severity of hand burns unchanged
- No clear evidence of ALARACT impact
- Possible contributing factors
  - Unit mobilization
  - Complete process
  - Functional equipment
  - Limited data set

Discussion

- Increase in overall burn severity post-ALARACT
  - Increased mean TBSA
  - Increased mean FT
- Decreased ratio of total hand burn to total TBSA post-ALARACT
- Suggests some level of protection provided

Conclusion

- Based on data collected thus far:
  - Impact of ALARACT is unclear
  - Hand protection remains a high priority
  - Incidence and severity of hand burns unchanged
  - Decreased ratio suggests possible relationship
  - Continued collaboration with PEO Soldier to improve protective equipment is warranted
  - Further investigation is required

Invited Discussion

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