



Blast-related Injuries and the Interdisciplinary Role of Audiology

Association of VA Audiologists
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Military Operations and Blast Injury

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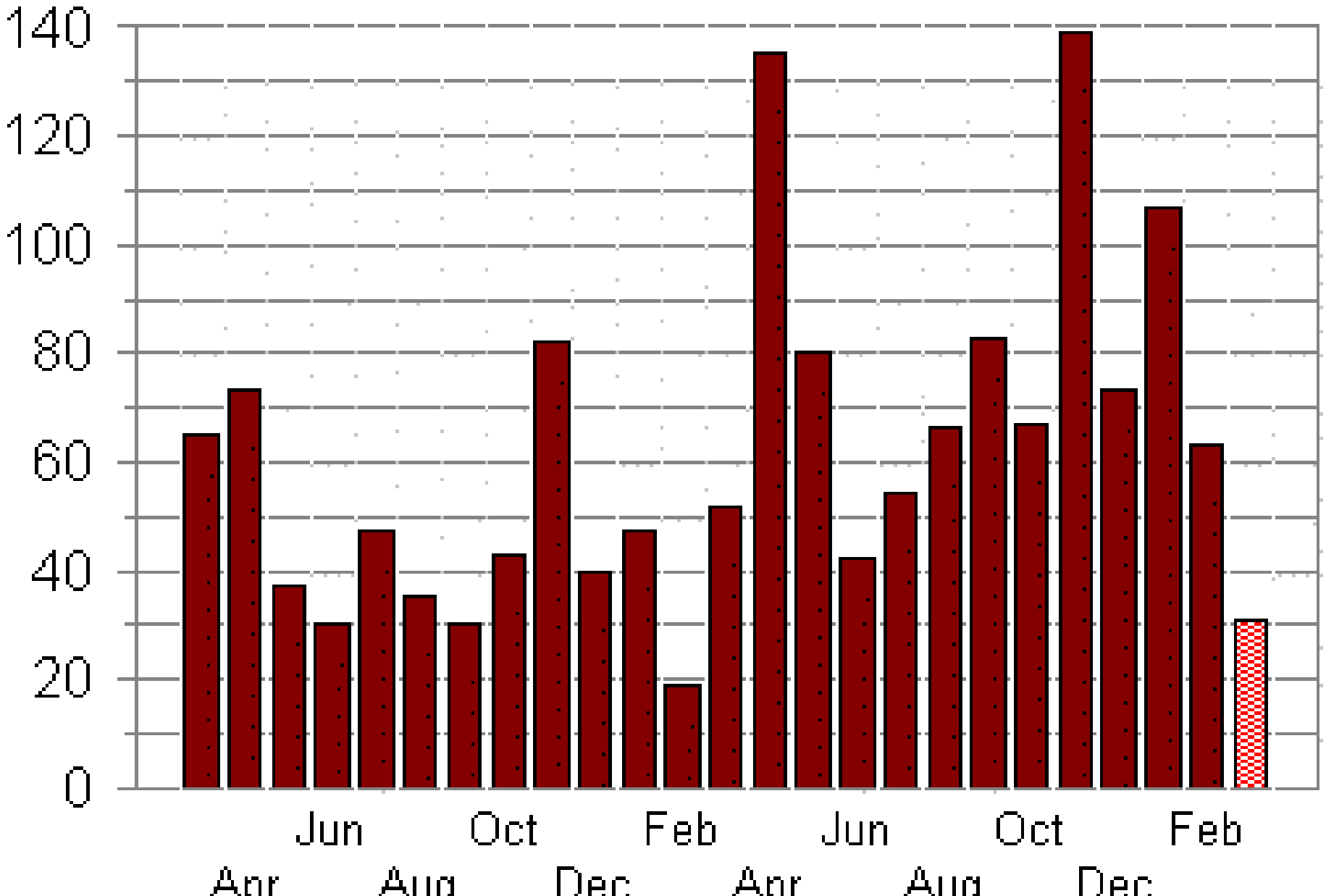
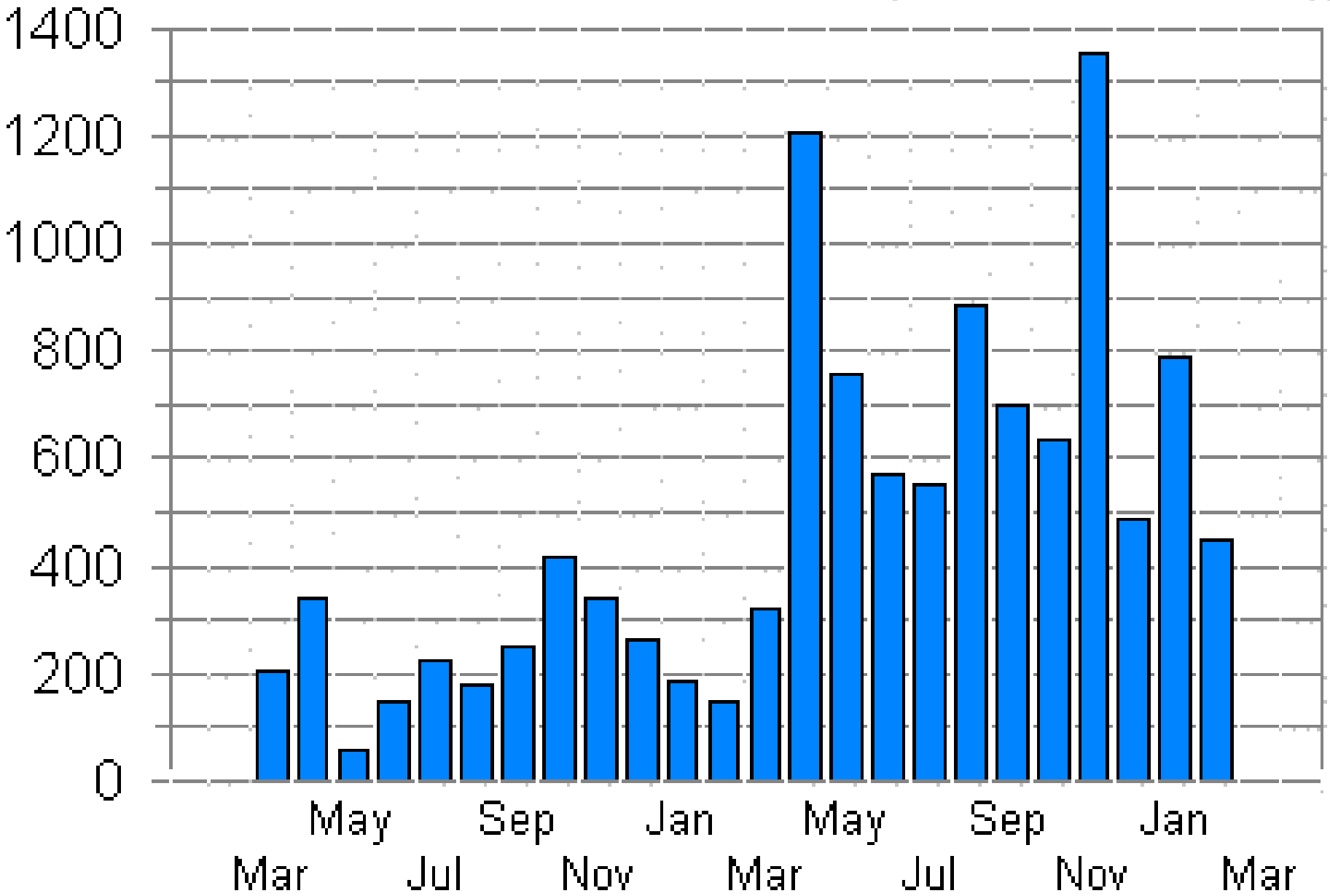
US Service Members Killed in Iraq

(Data from Global Security)

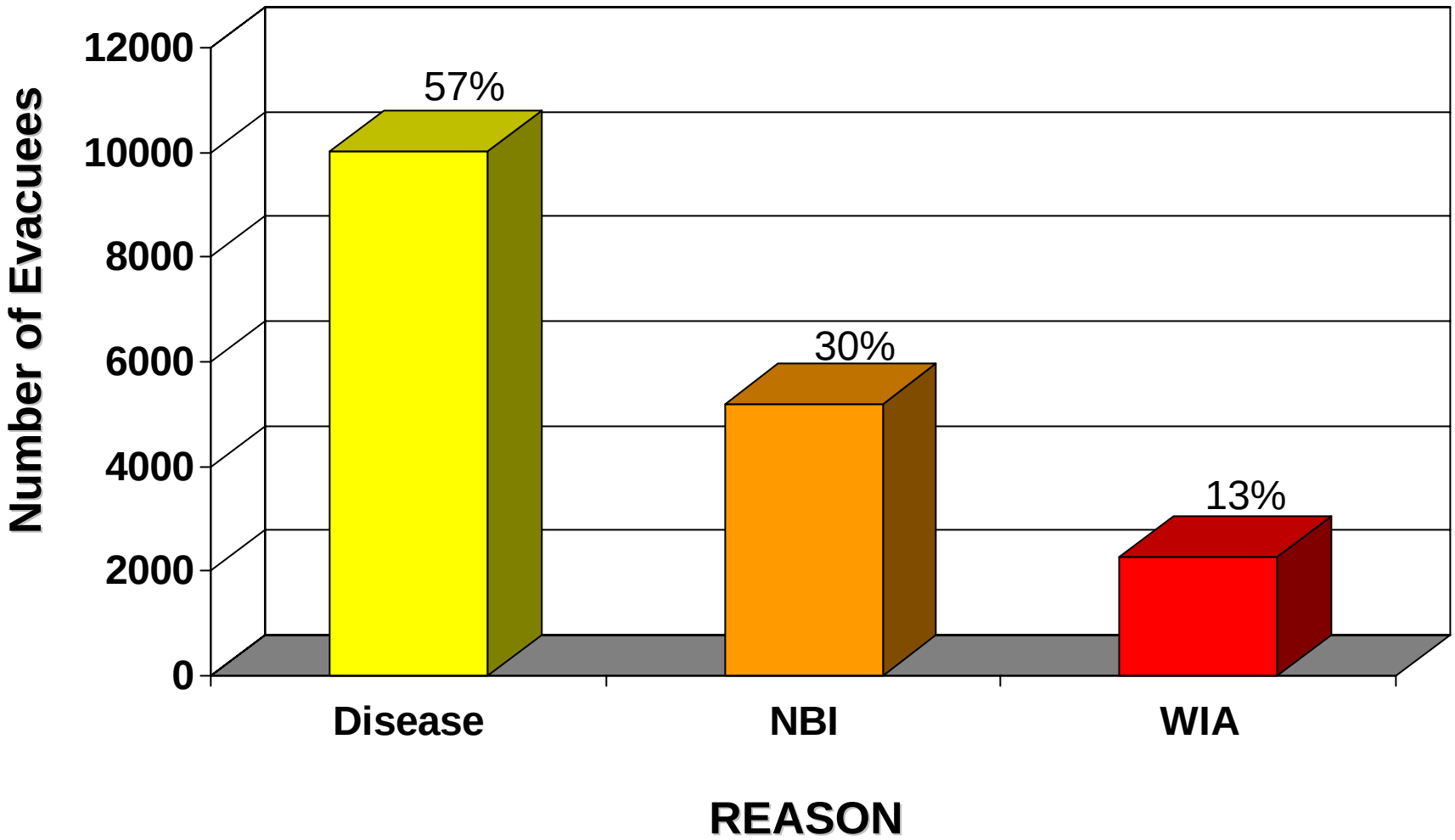


US Service Members Wounded in Iraq

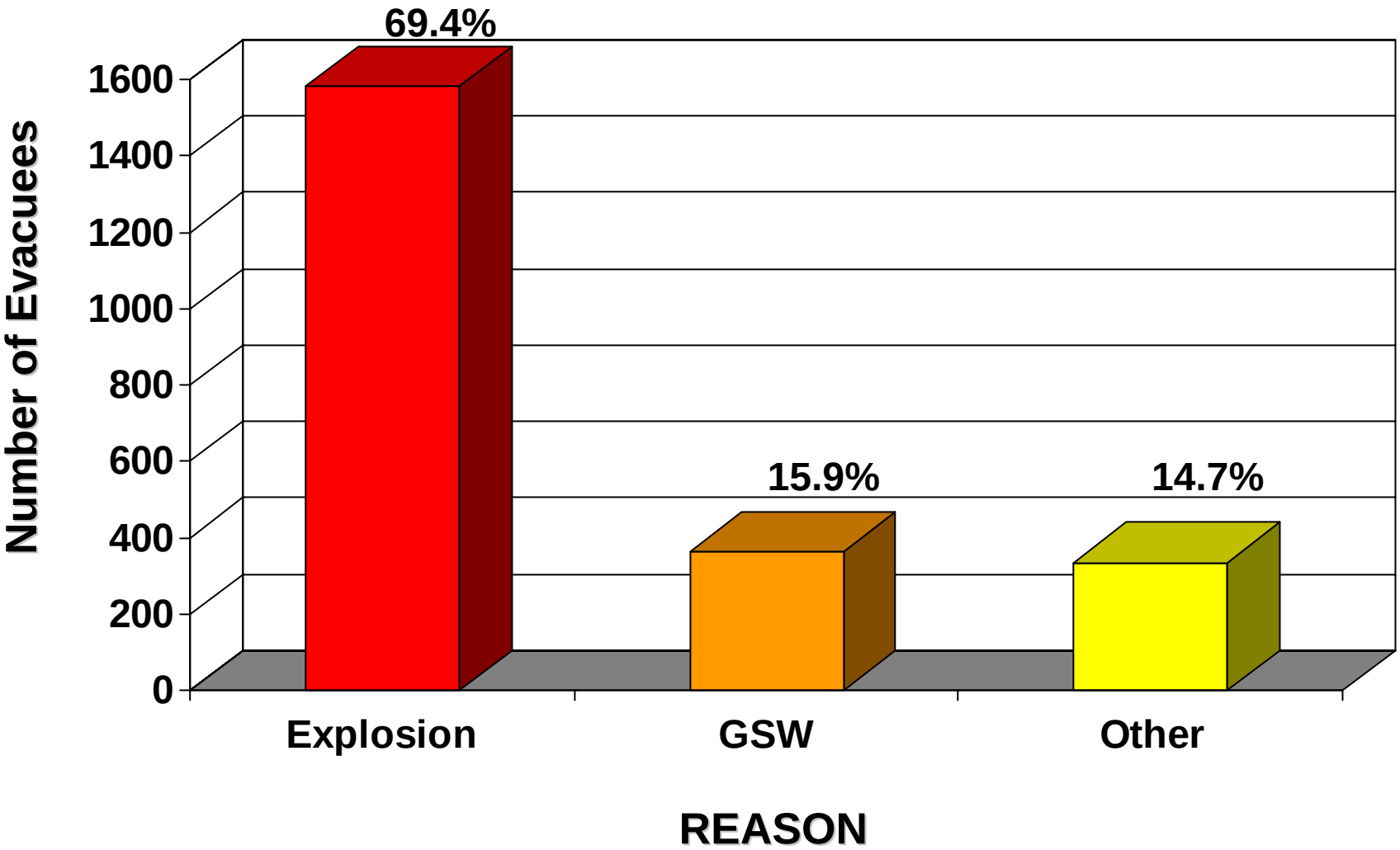
(Data from Global Security)



Evacuations to Army Facilities (17,443 thru 31 Dec 04)



WIA Evacuations
(2,278 thru 28 Feb 05)



UNCLASSIFIED

WIA EVAC - WOUNDED AREAS

2,278 WIA's - 4,111 Sites of Injury - 1.8 sites/WIA

(19 March 2003 – 28 Feb 2005)

HEAD/NECK

1322

(32.2%)

UPPER EXTREMITY

1221

(29.7%)

TORSO

477

(11.6%)

PELVIS

159

(3.9%)

LOWER EXTREMITY

932

(22.7%)

CAUSES

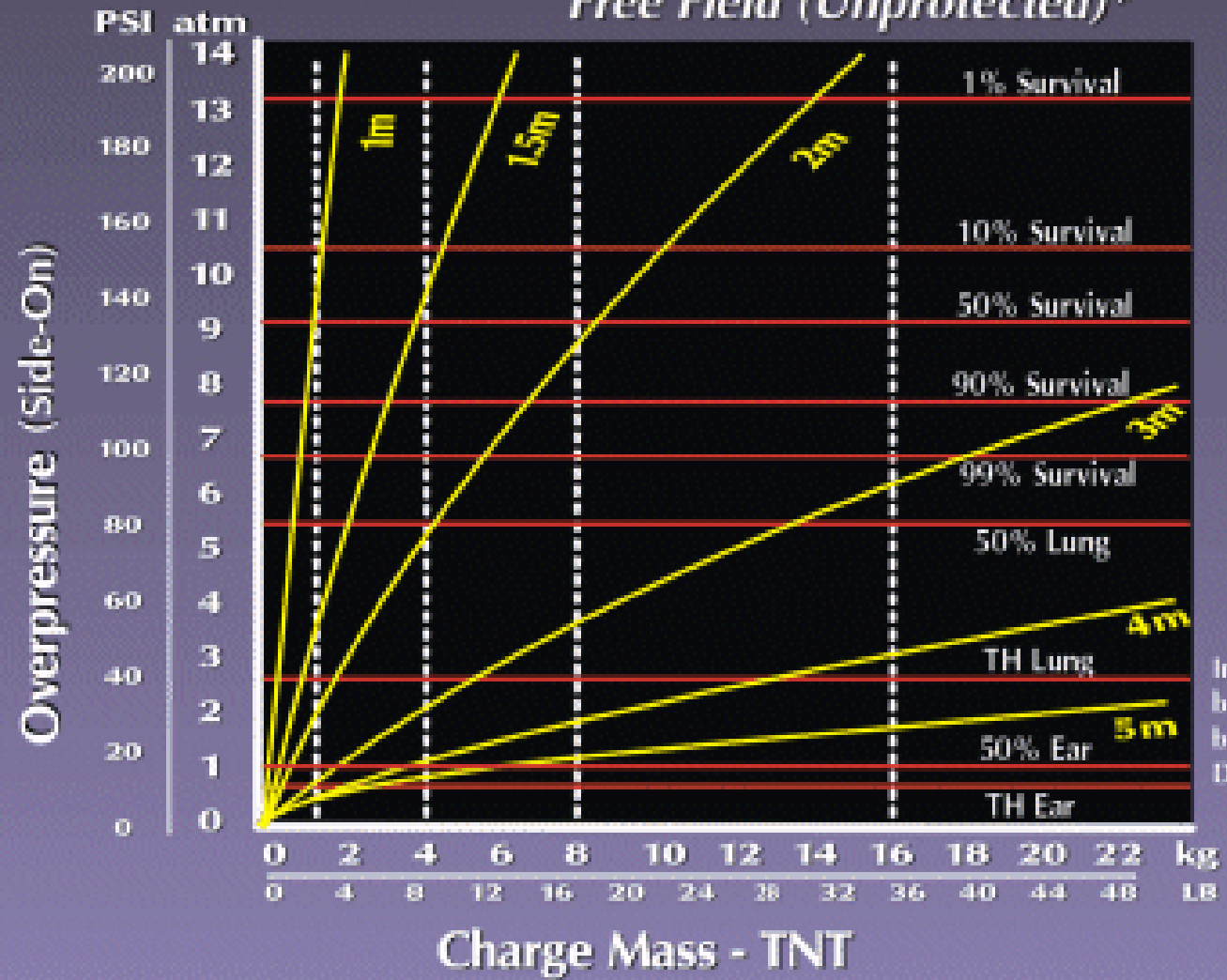
Explosion	1581
GSW	362
Other	335

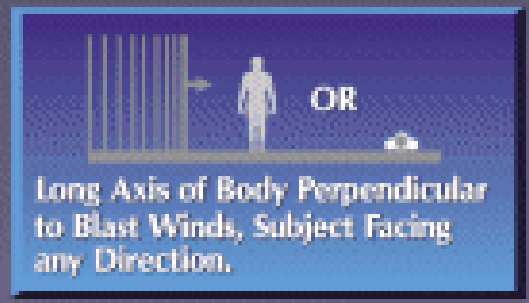
Military Medical Evacuation

Blast Overpressure

Theoretical Overpressure VS Charge Mass as a Function of Distance From Charge

*Free Field (Unprotected)**





Injury levels derived from data published by the Lovelace Foundation (DASA 2113, by I.G. Bowen, E.R. Fletcher, D.R. Richmond, DA-49-146-XZ-372, October 1968)

** Injury Levels Assume Positive Phase Duration of 1.5 msec.*

Mechanisms of Blast Injury

Category	Characteristics	Injury / Body Part Affected
Primary	Impact of overpressure wave	Gas-filled organs, GI tract, TBI, solid organs
Secondary	Shrapnel, debris	Whole body – Blunt trauma, penetrating, laceration, amputation
Tertiary	Projection of individual	Whole body – Fracture blunt trauma, amputation
Quarternary	Other injuries, illnesses	Whole body – Oxygen depletion, burns

Ambroise Paré (1510-1590):

“ … a great thunderous noise, large bells or artillery, and thus one often sees gunners losing their hearing whilst drawing the machinery because of the great agitation of the air inside the ear which breaks the aforementioned membrane and moves to the bones known as ossicles out of their natural position: so that the air is implanted or absorbed within the sinuses of the mastoid cavity and the patient has a continuous noise and air within the ear.”

Acute Ear Trauma

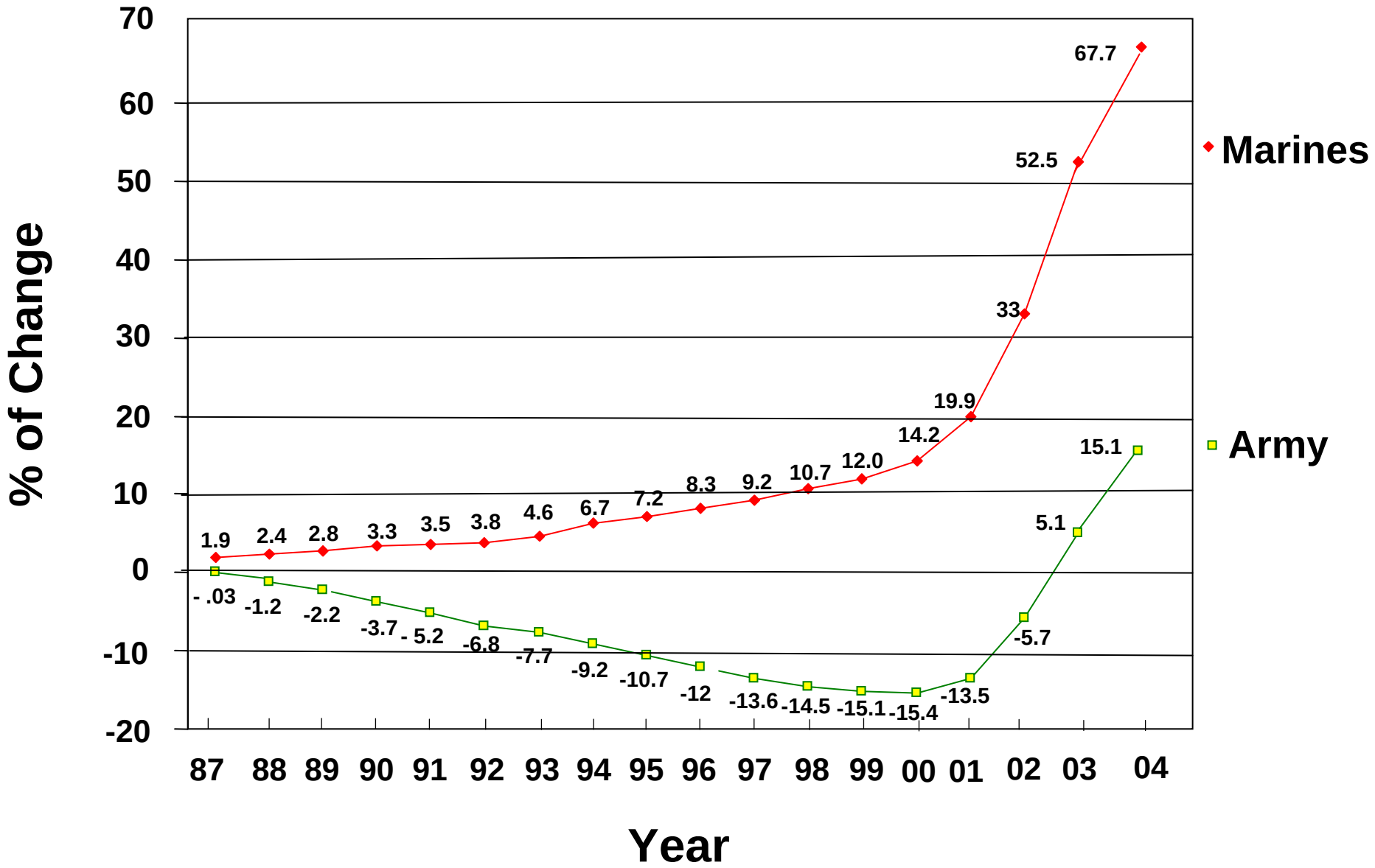
- Acoustic Trauma
  - Single event or intense exposure for short period
  - Duration < 1.5 ms
  - Typically affects one ear
  - Middle ear damage is unusual
- Blast Trauma
  - Single event, duration > 1.5 ms
  - Levels exceed 185 dB PPL
  - Usually bilateral
  - Frequent middle ear trauma

Current Scope Of Problem

- Hazardous noise exposure greatest in > 30 yrs
- Prev Med resources limited, compliance is poor
- Prevalence of NIHL increasing
  - Army claims increasing after 14 years of decline
  - 2004 had highest percentage of increase in >17 yrs

Army/Marine VA Hearing Loss Disability Cases

Percent of Change 1987-2004



Considerations

- Casualty trends
  - Survival rates
  - Types of injuries
- Patient status
  - Age
  - Citizen soldiers
- Terrorism threats
- Latent sequelae, long term effects