COMMITTEE ON SURGICAL COMBAT CASUALTY CARE POSITION STATEMENT: NEUROSURGICAL CAPABILITY FOR DEPLOYED OPERATIONS

INTENT OF POSITION STATEMENT

1. Inform the Joint Force on the best practices for care of combat casualties with traumatic brain injury and the deployment of neurosurgical capabilities during combat operations.
2. There is no doctrine which requires the deployment of neurosurgical capabilities within a military theater of operations. Therefore, recommendation for a collaborative approach to develop doctrine to assist/support the Service's and the Combatant Commands with registering a deployed neurosurgical capability as a requirement.
3. To improve battlefield care of service members with traumatic brain injury and other neurosurgical conditions.

FACTS

A neurosurgeon (NS) is board eligible or board certified in the medical specialty of Neurosurgery.
Neurosurgeons are not substitutable.
The Army, Navy, and Air Force Medical Corps all employ and deploy neurosurgeons.
Neurosurgeons practice highly specialized surgical care on the brain and spine and are the experts in the management and treatment of traumatic brain injuries.
Neurosurgical capability: NS; advanced imaging; required instrumentation; and critical care.
Immediate availability of a NS is a requirement and standard of care at Level 1 Trauma Centers.
Deploying neurosurgical capabilities will decrease battlefield attrition for neurologic conditions not requiring evacuation and decrease death from survivable head trauma.

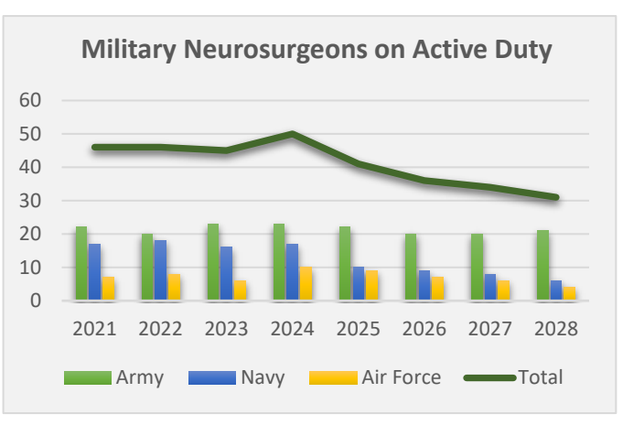
BACKGROUND AND RELEVANCE

Severe traumatic brain injury (TBI) is a leading mechanism of death on the battlefield. In recent conflicts, deployed neurosurgical capability resulted in improved survival in casualties with TBI.

- For conflicts in Afghanistan and Iraq, Department of Defense Trauma Registry (DoDTR) data demonstrate:
  - 14% of casualties sustained a traumatic brain injury.[1]
  - TBI was the mechanism of death for 30% of prehospital deaths from 2001 to 2011[2] and 45% of hospital deaths from 2001 to 2009.[3]
  - From 2014 to 2021, Armed Forces Medical Examiner System (AFMES) data demonstrate TBI accounted for 23% of prehospital deaths and 30% of hospital deaths (Unpublished JTS-AFMES Data).
  - More than 5,600 neurosurgical procedures were performed in-theater between 2002-2016.[1]
  - Casualties with a TBI and an indication for neurosurgical intervention were more likely to survive if they received surgery within 5 hours of injury.[4]
- Neurosurgical interventions performed on the battlefield after penetrating injuries result in improved survival.[5]
- Severe TBI also occurs during routine and crisis contingency operations, both ground and maritime combat, with an associated mortality of 69.7%.
  - The incidence of TBI after non-combat maritime mass casualty events such as collisions is 5.8%; during modern naval warfare when warships are attacked by missile strikes or other explosive devices, the incidence of severe TBI is 17.2%.[6]

ASSUMPTIONS AND RISK

1. Future operations are anticipated to be large-scale combat operations (LCSO) with large numbers of casualties, multiple mass casualty incidents and delays in evacuation.
2. High rates of neurosurgical injuries are anticipated in LCSO.
3. A deployable neurosurgical capability is a critical planning factor for the predicted frequency of TBI in future conflict
4. Given the number of neurosurgeons in each Service, there will not be enough neurosurgeons for future operations, especially for large-scale combat.
5. The projected neurosurgeon requirement cannot currently be met by any Service.



6. Other medical/surgical specialties do not have the same level of training and expertise in TBI and other neurosurgical procedures; there is no substitution for a fully trained neurosurgeon in any healthcare system, whether military or civilian.

RECOMMENDATIONS

The Committee on Surgical Combat Casualty Care, Defense Committee on Trauma, and Joint Trauma System recommend the following to mitigate the risk to the Joint Force from TBI and other neurological injuries:

1. Implement a joint interoperable Neurosurgery support for military operations where:
   a. Role 3 care is not Service specific, and neurosurgeons are interchangeable between the Services.
   b. Service recruitment and retention of neurosurgeons are prioritized.
2. Recommend battlefield planning to provision rapid neurosurgical intervention and access to neurosurgical care within 5 hours of injury to decrease death and disability from TBI.
3. Role 3 Military Treatment Facilities (MTFs) must include multidisciplinary teams with a neurosurgeon and a critical care physician to appropriately care for service members with severe TBI.
4. If a military theater of operations requires multiple Role 3 MTFs, neurosurgical capability should be distributed so casualties can access neurosurgical care within 5 hours of injury.
   a. While neurosurgical capability must be located at Role 3 facilities, not all Role 3 facilities require a neurosurgeon provided the five-hour evacuation target is achieved.
   b. Neurosurgery capability is exclusively a Role 3 or above asset.
5. To support large and geographically dispersed operations, neurosurgical telemedicine capability should be coupled with strategically placed portable Computed Tomography (CT) scanners at Role 2 MTFs; these paired capabilities would allow more appropriate use of limited evacuation resources, mitigating risk in a limited resource environment.
6. Contingency planning for neurosurgical care in theaters without a Role 3 MTF should leverage approved allied or host nation health systems which can provide a comparable level of care as determined by the Theater Trauma Medical Director.

REFERENCES

1. Turner CA, Stockinger ZT, Gurney JM. Combat surgical workload in Operation Iraqi Freedom & Enduring Freedom: the definitive analysis. J Trauma Acute Care Surg. 2017 Jul;83(1):77-83.
2. Eastridge BJ, Mabry RL, Seguin P, et al. Death on the battlefield (2001-2011): implications for the future of combat casualty care. J Trauma Acute Care Surg. 2012 Dec;73(6 Suppl 5):S431-7.
3. Eastridge BJ, Hardin M, Cantrell J, et al. Died of wounds on the battlefield: causation and implications for improving combat casualty care. J Trauma Acute Care Surg. 2011 Jul;71(1 Suppl):S4-8.
4. Shackelford SA, Del Junco DJ, Reade MC, et al. Association of time to craniectomy with survival in patients with severe combat-related brain injury. Neurosurg Focus. 2018 Dec 1;45(6):E2.
5. DuBose JJ, Barmparas G, Inaba K, et al. Isolated severe traumatic brain injuries sustained during combat operations: demographics, mortality outcomes, and lessons to be learned from contrasts to civilian counterparts. J Trauma Acute Care Surg. 2011 Jan;70(1):11-6; discussion 16-8.
6. Tadlock MD, Gurney J, Tripp MS, et al. Between the devil and the deep blue sea: A review of 25 modern naval mass casualty incidents with implications for future Distributed Maritime Operations. J Trauma Acute Care Surg. 2021 Aug 1;91(2S Suppl 2):S46-S55.

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