Extremity War Injuries: Current Management and Research Priorities

The United States Armed Forces have been engaged in combat operations for more than 10 years. Not enough can be said about nor enough gratitude expressed to our troops for their commitment and sacrifice during this period. This supplement to the *Journal of the American Academy of Orthopaedic Surgeons* is dedicated to the men and women of the United States Armed Services and to their families and friends who support them.

The terrorist attacks on New York City, Washington, DC, and Pennsylvania on September 11, 2001, set in motion what has become the longest sustained armed conflict in American history. In the past decade of war, much has been learned about the care of the combat casualty and combat-related wounds. These advances would not have been possible without the cooperation of many dedicated civilian orthopaedic organizations.

Since combat operations began in 2001, more than 6,400 US service members have lost their lives, and more than 48,000 have sustained combat injuries.¹ Troop vehicle design, body armor, and far-forward advanced surgical care have combined to yield the highest war injury survival rates in history. In World War II, the survivability rate was 70.7%.² This rate increased to the mid 70th percentile for the conflicts in Korea and Vietnam. For the conflicts in Iraq and Afghanistan, the survivability rate was 89.7% as of 2011. Survivability steadily increased from 80.8% in 2001 to 92.0% in 2011.

More than 70% of combat casualties suffer extremity trauma.³ Unpublished data obtained from the US Military Amputee Database indicate that as of April 22, 2012, 1,453 injured US service members had required limb amputation, with 1,015 experiencing single limb loss and 438 experiencing multiple limb loss. Many other wounded service members have undergone successful limb salvage.

The inaugural Extremity War Injuries (EWI) symposium, held in 2006, focused on the difficulties related to combat casualty care and defined the state of practice at that time. At that meeting, knowledge gaps were identified and research priorities established. As a result of the annual EWI symposia series, several different funding mechanisms became available to investigate the problems facing surgeons and patients. This cycle was refined over subsequent symposia, focusing on particularly difficult problems, potential solutions, and reports of advances made. Subsequent symposia have focused on the challenges of orthopaedic care and reconstruction, such as infection, bone loss, and posttraumatic arthritis. New challenges have arisen, such as limiting combat-related death resulting from severe extremity heterotopic ossification and treating patients with multiple limb loss.

EWI VI, “Data-Driven Progress in
# Extremity War Injuries: Current Management and Research Priorities

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injured service members after far-
matic decrease in mortality rates of
and the lessons learned in the dra-
achieved in the recent conflicts,
most promising lifesaving military
care. The tourniquet is one of the
control are key elements of acute
surgical débridement, and infection
related research. Recent research has
shed new light on aspects of medical
evacuation, wounding patterns, and
bioburden, which has resulted in im-
proved patient care.

At the EWI VII Symposium, sev-
eral research priorities were outlined
in the areas of acute care, reconstruc-
tion, and rehabilitation, including
the development of mechanisms to
obtain junctional large-vessel control
in the groin and axilla, education in
and the effectiveness of surgical dé-
bridement techniques, use of the Masquelet technique for bioactive
membrane formation and other seg-
mental defect techniques, timing of
wound closure and flap coverage,
long-term complications of disability
secondary to posttraumatic arthritis,
and long-term complications follow-
ing amputation and limb salvage.

Military surgeons recognize the un-
derpublicized burden of disability
experienced by limb salvage patients.
Arthritis and functional loss related
to nerve injury or missing muscle are
common sequelae of lower extremity
limb salvage. The EWI VIII sympos-
ium, scheduled for February 9–11,
2013, in Washington, DC, will focus
on the sequelae of combat injuries,
including joint preservation and joint
replacement in patients with post-
traumatic arthritis, complex upper
extremity injuries, infection, junc-
tional injuries, multiligamentous
knee injuries, and long-term sequelae
of amputation.

The annual EWI symposia provide
a collaborative forum in which mili-
tary and civilian surgeons establish
and execute an aggressive research
agenda focused on topical clinical is-
sues. The US Department of Defense
and congressional leaders recognize
the potential positive impact on both
military and civilian trauma patients
and continue to support and partici-
pate in the symposia. Importantly,
Congress has continued to allocate
significant funds to support basic sci-
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For additional information on the EWI symposia series, please visit www.aaos.org/ewi.

**References**

