



29th Annual Gabor Racz
Advanced Interventional
Pain Conference and Workshop
Budapest, Hungary August 24-26, 2026

Challenges in Pain Management in War Zones

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Disclosures

- **Immediate Past-President**, The British Pain Society
- **Board Member**, World Society of Pain Clinicians
- Past-Section Chair, United Kingdom, World Institute of Pain
- Past Hon. Secretary, Neuromodulation Society of UK & Ireland
- Past Councilor, European Pain Federation
- Past Council Member, Faculty of Pain Medicine, Royal College of Anaesthetists
- Past Chapter President, International Association of Study of Pain
- Executive Council Member, London Pain Forum
- Past-President, Northwest Pain Society



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Disclosures

- **Co-chair** Guidelines Development Group UK – Cancer pain
- **Co-chair** Guidelines Development Group UK – Neuromodulation
- **NICE** – Member GDG – Care of the Dying
 - Advisor on Interventional procedures
 - Advisor on Cancer Pain
- Member, European Task Force on Cancer Pain
- Member, International Education Committee, Spinal Intervention Society (SIS)
- **Co-chair**, International Collaboration on Opioid Analgesic Dependency
- **Co-chair**, Dosing Guidance Group for safe prescribing of Medicinal Cannabis
- Member, Polyanalgesic Consensus Group for use of Intrathecal Analgesia
- Member, International Group on Low Back Pain Management
- Member, International Group on Cervical Spine Pain Management
- Member, International Consensus Group for Contrast use in Pain Interventions
- Member, Consensus Group for use of Lidocaine infusions for Pain Management
- Faculty of Pain Medicine representative, Specialist Appointments Committee, Palliative Medicine, Royal College of Physicians



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Disclosures

Travel grants/ equipment from the following companies

- Biowave Ltd
- Aurimed Ltd



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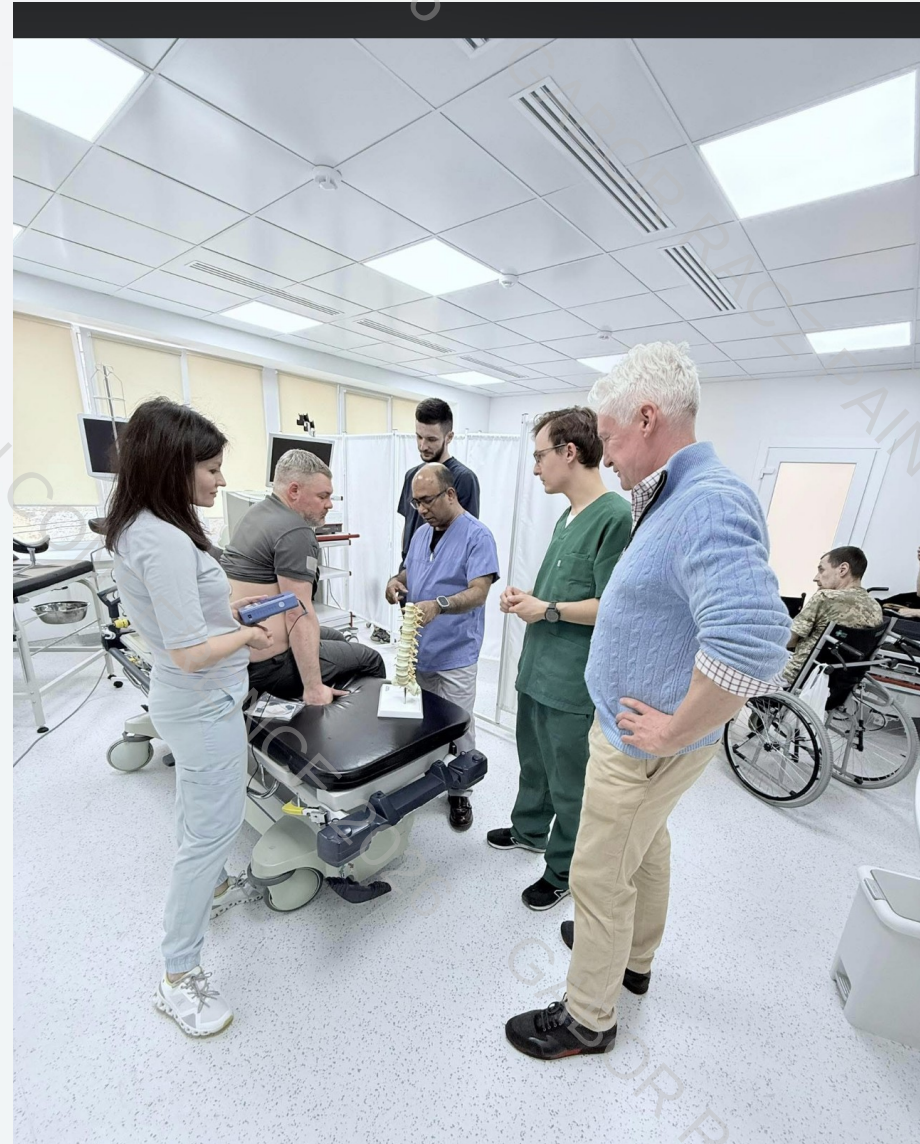


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Ongoing Major Armed Conflicts (2026)

- **Russia-Ukraine war** - 4th year; High-intensity artillery/drone warfare
- **Israel-Gaza conflict** - Urban warfare, high civilian trauma burden
- **Sudan civil war** - Largest displacement crisis; collapsed health system
- **Myanmar civil conflict** - Protracted insurgency, limited access
- **Sahel region conflicts** - Minimal trauma care infrastructure



Types of Major Trauma in Conflict

- **Blast Injuries**

- Primary - Overpressure damage to air-filled organs
- Secondary - Fragmentation/shrapnel (leading cause of extremity injury)
- Tertiary - Body displacement, blunt trauma
- Quaternary - Burns, crush, toxic inhalation

- **Other Mechanisms**

- Ballistic wounds - High-velocity cavitation injury
- Landmine/IED - traumatic amputation triad



Types of Major Trauma in Conflict

- **Blast Injuries** 70-80% of combat extremity injuries from explosive mechanisms - (JTS/ICRC data)
 - Primary - Overpressure damage to air-filled organs
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Scale of Trauma: War vs. Civilian Life

- Injury Severity Score (ISS) - Much higher in combat casualties
- Polytrauma rate - 30-40% (Combat) vs ~10% (Civilian)
- Amputation rate - 15-20 times higher per injured patient in war
- Mechanism - Blast/penetrating (War) vs Blunt trauma (Civilian)

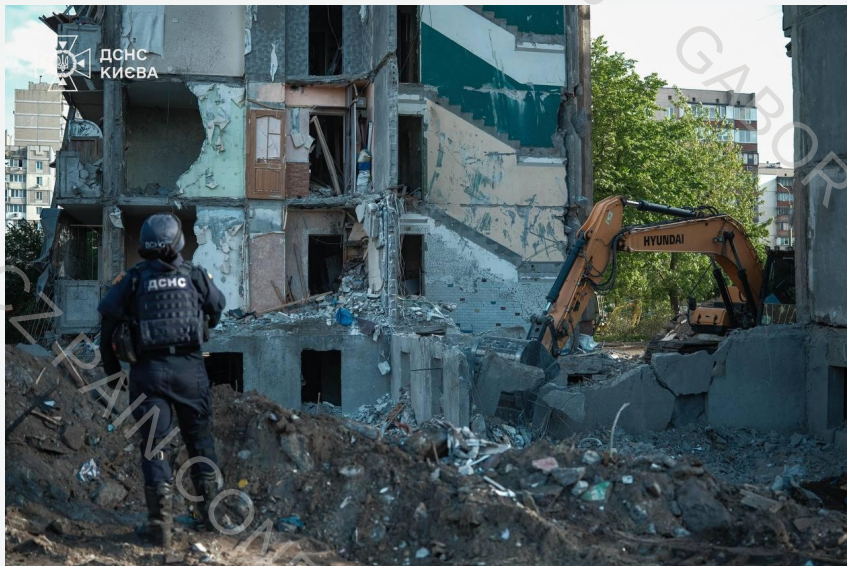


Loss of Infrastructure & Supply Lines

- Facility destruction - 1,500+ attacks on healthcare (WHO SSA, Ukraine)
- Supply chain disruption - Blood, antibiotics, consumables scarce
- Staff shortages - Displacement/casualties among healthcare workers
- Power/water loss - Compromises sterile conditions



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Battlefield Priorities vs. Evacuation

- **Tactical Combat Casualty Care (TCCC) Framework**

- Care Under Fire - Haemorrhage control only
- Tactical Field Care - Airway, IV access, Analgesia (Morphine/ Fentanyl)
- Tactical Evacuation Care - Transport + ongoing resuscitation

MERT/CASEVAC systems in Afghanistan.

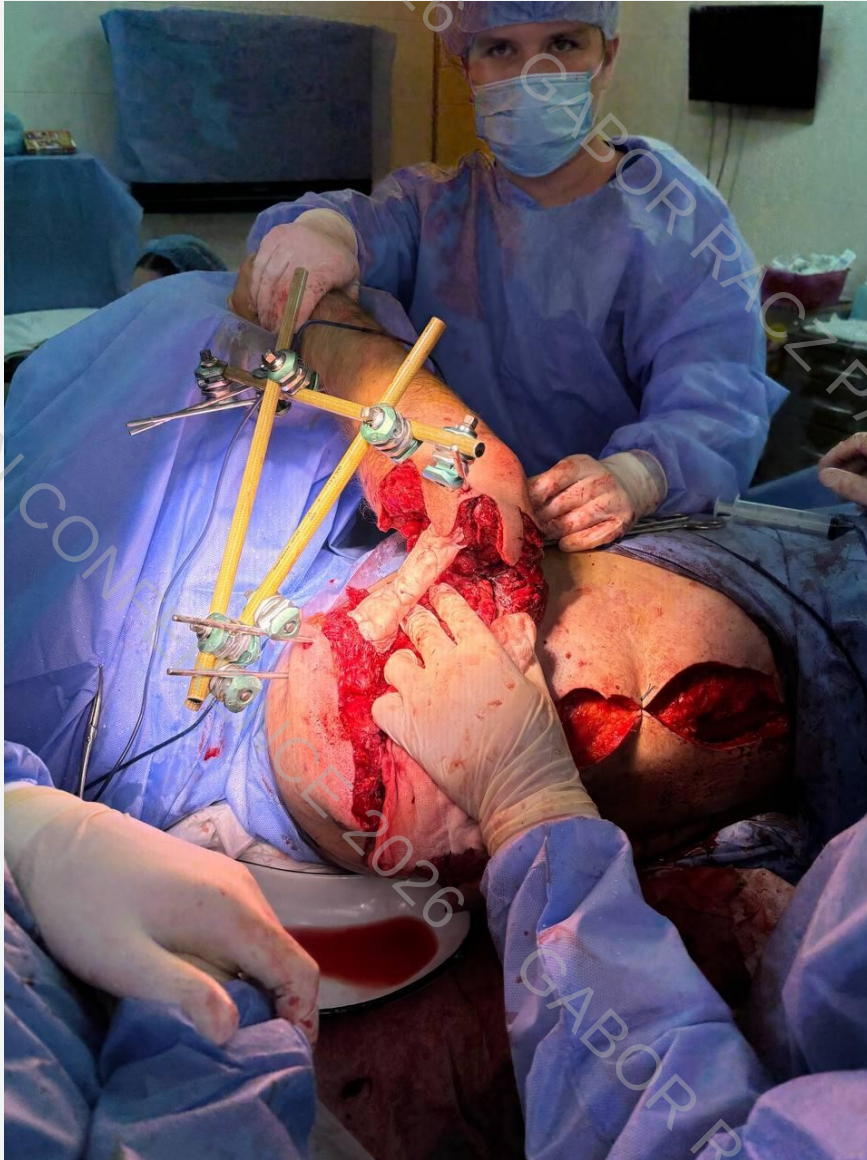
- **Evacuation Timing Evidence**

- <60 min evacuation ("**Golden hour**") - mortality 14% → <5%

Morrison et al., J Trauma Acute Care Surg, 2013

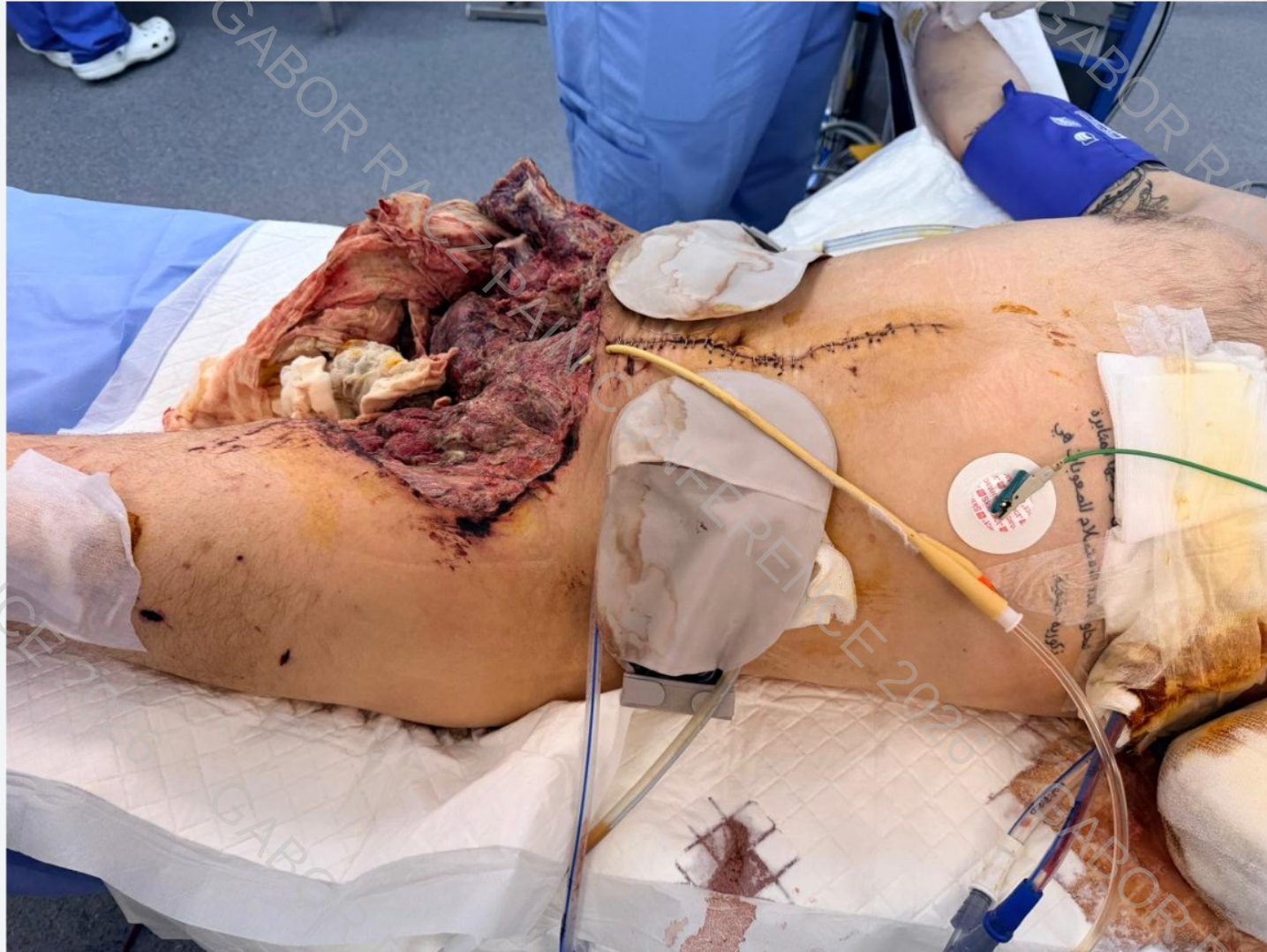


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First Aid, Triage, and Tourniquets

- **Point-of-Injury First Aid**

- Hemorrhage control - leading preventable cause of death
- Tourniquet application - High, Tight, Immediate
- Hemostatic dressings - Combat gauze for junctional wounds
- Survival benefit if applied before shock onset
- Tourniquet safety data challenging outdated fears.

Kragh et al. (2009) - 2,800+ applications, no increased amputation risk

- **Triage Categories (NATO)**

T1 Immediate / T2 Delayed / T3 Minimal / T4 Expectant



NATO Triage Categories

T1 (Immediate / Red):

- Critically injured patients who require rapid, immediate life-saving interventions or emergency surgery.
- Procedures must be short and have a high chance of success (e.g., Tension pneumothorax, Severe controllable hemorrhage, Airway obstruction).

T2 (Delayed / Yellow):

- Patients with significant injuries who need surgical care, but whose general condition is stable enough to tolerate a delay without immediate threat to life.
- Stabilization minimizes the effects of the delay (e.g., long bone fractures with pulses intact, stable large muscle wounds).

T3 (Minimal / Green):

- "Walking wounded" or ambulatory patients with minor injuries.
- Can manage with self-care or basic first aid provided by minimally trained staff.

T4 (Expectant / Blue or Gray):

- Patients with catastrophic, unsurvivable injuries given the available resources and medical capacity.
- Care is restricted to comfort or palliative measures only (e.g., Massive uncontained burns, Severe



Blast Zones and Injury Severity

- **Epicenter (Lethal Zone):**

- Location: Immediately adjacent to the detonation point.
- Injuries: Most individuals suffer fatal, catastrophic primary blast injuries, severe total-body disruption, massive blast lung, severe head trauma, or immediate vaporization/suffocation. Survivors are rare.

- **Secondary Perimeter (Critical Casualty Zone):**

- Location: The area surrounding the epicenter.
- Injuries: Survivors here frequently present with severe multiple trauma, combining primary blast effects (such as ruptured eardrums, bowel perforations, and mild traumatic brain injury) alongside extensive secondary fragmentation wounds and tertiary blunt trauma from being thrown.

- **Blast Periphery (Walking-Wounded Zone):**

- Location: The outer ring of the blast radius.
- Injuries: Casualties mostly sustain non-life-threatening injuries, superficial lacerations from minor debris, mild burns, temporary hearing impairment, and acute psychological trauma.



Life-Saving vs. Limb-Saving Surgery

- Damage Control Surgery Principles
 - Hemorrhage control - packing, shunting
 - Contamination control - debridement, no primary closure
 - Skeletal stabilization - external fixation
 - Physiological resuscitation - correct lethal triad
- Life vs. Limb Decision
- Primary amputation often life-saving in unstable/mass casualty settings
- Similar 2-year outcomes; Salvage = Higher complications



Wound Care: Secondary Surgeries & Dressings

- Staged Wound Management
 - Initial debridement
 - Delayed primary closure (48-72 hrs)
 - Serial debridement (3-5 returns to theatre)
- Negative pressure wound therapy (NPWT)
 - Reduces infection during evacuation.
- High MDR organism burden (*Acinetobacter baumannii*) drives "leave open" doctrine.

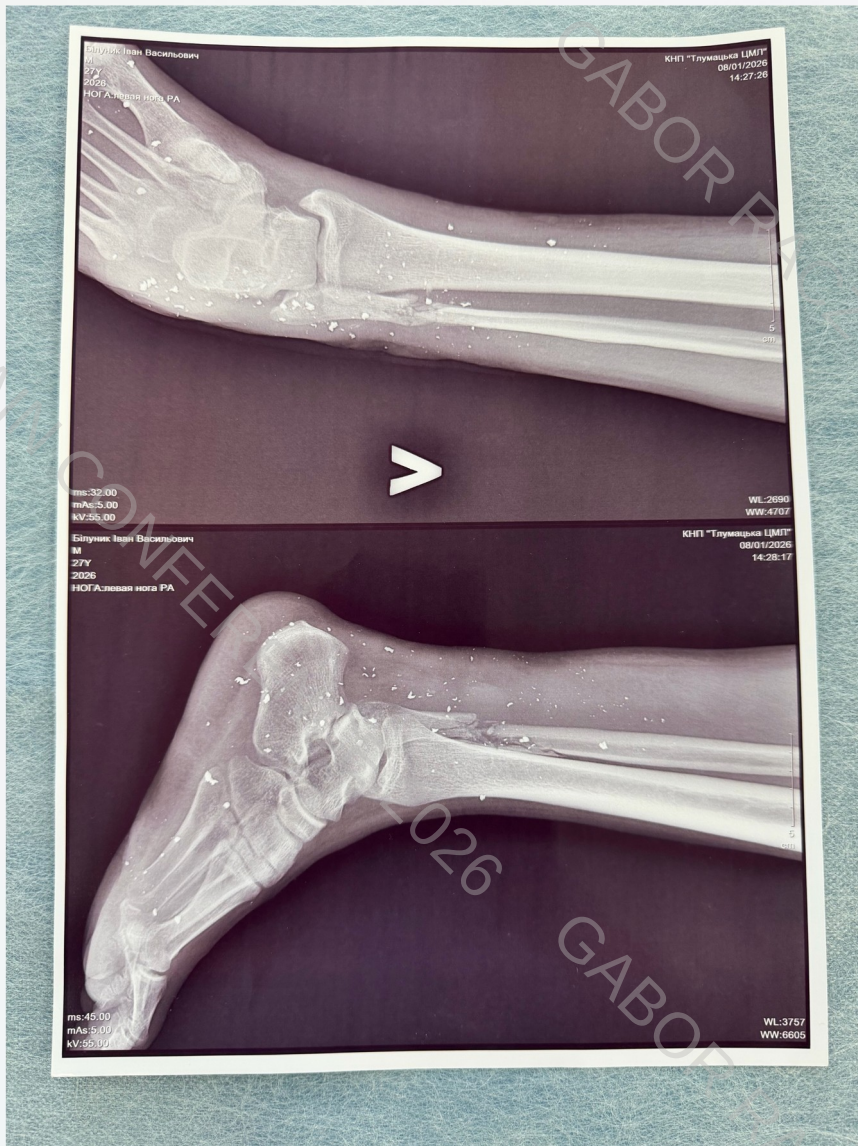


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Metalwork and Wound Infection

- External fixation - preferred initial method
- Delayed internal fixation - only once infection risk passed
- Infection rates - 25-40% in combat open fractures vs 5-10% civilian equivalents



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Secondary Amputation & Flap Reconstruction

- Secondary Amputation Causes
 - Uncontrolled infection
 - Non-viable tissue on re-exploration
 - Non-reconstructable vascular/nerve injury
 - Patient-driven decision after failed salvage
- Flap Reconstruction
 - Free flap transfer - Latissimus dorsi, ALT flaps
 - Early coverage (<72 hrs) - lower infection/failure rates

UK Defence Medical Services data (Ramasamy et



Pain Management: Acute and Chronic

- Acute Pain
 - Ketamine/opioids - Battlefield analgesia of choice
 - Regional anesthesia - Nerve blocks/catheters reduce opioid load
- Chronic Pain
 - Phantom limb pain - 60-80% of combat amputees
 - Neuropathic pain - neuroma formation
 - Pre-amputation regional blockade
 - Mirror therapy (Ramachandran; validated RCTs)
 - Targeted Muscle Reinnervation (TMR) - Walter Reed data

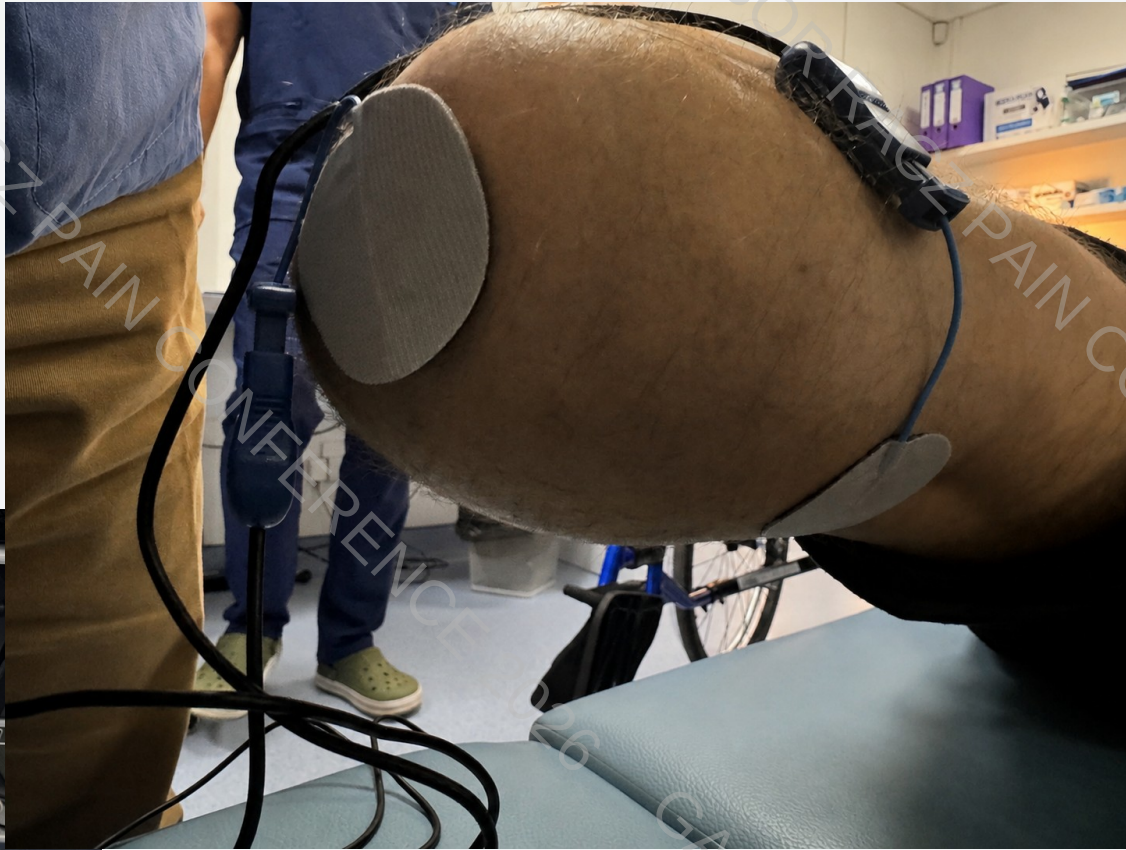


Rehabilitation with Prosthesis

- Rehabilitation Pathway
 - Pre-prosthetic phase - wound maturation, shaping
 - Prosthetic fitting - modular sockets, rapid fitting
 - Functional training - gait, strength, psychological support
 - Advanced technology - myoelectric prosthetics, osseointegration (Al Muderis et al.)
- Integrated mental health support - PTSD/depression are key outcome determinants.
- Progression to Bionic prosthesis



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Personal Experience

- Pain Management
 - Medications – Pregabalin/ Amitriptyline
 - Botox
 - SCS
 - Non-invasive peripheral neurostimulation
 - VNS for PTSD
- Conscript vs Regular army personnel
- Rehabilitation group
 - Amputation
 - Nerve injury
 - Low back pain



Summary

- War trauma = higher energy transfer, greater contamination, severe polytrauma
- Care depends on continuous chain: hemorrhage control → evacuation → damage control surgery → staged wound care → rehabilitation
- Evidence from Iraq/Afghanistan/Ukraine increasingly informs civilian trauma systems
- Rehabilitation is very expensive and is not timely
- Scaling of care giving is a challenge



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