

Chapter 51

THE HOME BASE: QUEEN ELIZABETH HOSPITAL BIRMINGHAM AND OTHER HOSPITALS IN THE UNITED KINGDOM

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INTRODUCTION

The essential challenge for clinicians at Role 4 is to integrate with and extend the care given in the operational theater. In the United Kingdom (UK), responsibility for continuity of acute care rests primarily with the University Hospitals Birmingham National Health Service (NHS) Foundation Trust, a comprehensive publicly funded acute care provider as defined within NHS legislation. Military patients are admitted to the Trust's teaching hospital, the Queen Elizabeth Hospital Birmingham (QEHB) (Exhibit 51-1), which hosts the Royal Centre for Defence Medicine (RCDM),

whose primary role is to support deployed operations. At any one time, military patients constitute only 1% of total patient numbers, but the resource-intensive nature of their injuries imposes a significant surgical workload that necessitates considerable planning to ensure their clinical care while avoiding interruption to the hospital's usual NHS activity. The logistical requirements include a system of command and communication that cascades from the care given at Roles 1 through 3 to the receiving teams at Role 4 (Exhibit 51-2).

PATIENT ADMISSIONS AND DISPOSITION

Injured military personnel are transported by aeromedical evacuation teams or, in the case of the critically ill, by specially trained and tasked critical care air support teams. Repatriation of the casualty to Birmingham can be expected within 24 to 48 hours of injury. Given

this condensed timeline, seriously injured personnel are often still in the "damage control phase" of their surgical management.¹

On admission to the QEHB, ventilated patients will be transferred to critical care by the critical care air support team staff, where an immediate assessment of their injuries and physiological status is undertaken before continued stabilization or immediate surgery. In many cases this will be the "second look" following resuscitative surgery at Role 3.² Such surgery is limited by a patient's physical status and is often the first of repeated visits to the operating room until the patient's clinical condition improves enough to consider definitive surgery for function restoration.

The signature injury of the conflict in Afghanistan has been blast injury from improvised explosive devices. The secure medical signals received at Role 4 will

EXHIBIT 51-1

THE QUEEN ELIZABETH HOSPITAL BIRMINGHAM

- Commissioned in June 2010.
- Contains 1,213 beds.
- Serves as a tertiary referral teaching hospital undergoing accreditation as a Role 1 trauma center.
- The department of anesthesia has 70 National Health Service consultant staff, 24 of whom are also part of the cadre of 32 intensivists.¹
- Has a total of 100 intensive care beds; 25 each are designated for trauma, neurological sciences, cardiothoracics, and general critical care.²
- Has a designated military ward with 32 beds, and 40% are single patient rooms.
- Staff includes embedded military clinicians from the Royal Centre for Defence Medicine, including four anesthetists, four orthopedic surgeons, three plastic surgeons, and one general surgeon.
- The Royal Centre for Defence Medicine clinicians are supported by military academic departments of anesthesia and critical care, surgery, and emergency medicine.

(1) Hodgetts TJ, Mahoney PF, Kirkman E. Damage control resuscitation. *J R Army Med Corps.* 2007;153:299–300. (2) Jones CP, Chinery JP, England K, Mahoney P. Critical care at role 4. *J R Army Med Corps.* 2010;156(Suppl 1):S342–348.

EXHIBIT 51-2

ESSENTIAL REQUIREMENTS FOR RECEIVING CASUALTIES AT ROLE 4

- Secure signals detailing the numbers of expected casualties and nature of injuries are necessary.
- Trauma coordinators should ensure that key clinical personnel are aware of incoming casualties and operating theater space and organize critical care beds as necessary.
- Sufficient and appropriately trained staff must be available to receive patients at ward and critical care locations.
- Dedicated laboratory support should also be available, particularly to maintain blood and blood product supplies for critical care patients.

EXHIBIT 51-3

ANESTHETIC CONSIDERATIONS FOR THE CRITICALLY INJURED MILITARY PATIENT

- Continue anesthesia as part of the damage control philosophy, and pay rigorous attention to the physiological control of tissue oxygenation to avoid or correct the lethal triad of coagulation, hypothermia, and lactic acidosis.¹
- Consider the evolution of the patient's wounds and physiology during transfer from Role 3. Upon arrival at the Queen Elizabeth Hospital Birmingham, patients' pathophysiology is frequently complicated by the systemic inflammatory response syndrome.²
- Use blood/fresh frozen plasma and other specialized hemostatic therapies as practiced at Role 3. Hemostatic resuscitation is guided by standard laboratory tests plus near patient assessment with thromboelastometry.³
- Restrict crystalloid use (unless specific indications exist) to allow better hemostatic resuscitation and decrease edema.
- Be aware of evolving blast lung injury and use appropriate ventilator strategies.⁴
- Change Role 3 resuscitative central lines and ensure nasogastric feeding tube in situ.

(1) Wood PR, Haldane AG, Plimmer SE. Anaesthesia at role 4. *J R Army Med Corps.* 2010;156(Suppl 1):S308–310. (2) Jones CP, Chinery JP, England K, Mahoney P. Critical care at role 4. *J R Army Med Corps.* 2010;156(Suppl 1):S342–348. (3) Midwinter MJ, Woolley T. Resuscitation and coagulation in the severely injured trauma patient. *Philos Trans R Soc Lond B Biol Sci.* 2011;366:192–203. (4) Brower RG, Morris A, MacIntyre N, et al. Higher versus lower positive end expiratory pressures in patients with the acute respiratory distress syndrome. *N Eng J Med.* 2004;351:327–336.

detail a patient's specific injuries so that the appropriate clinicians can assess him or her upon arrival. The clinical group will include those responsible for performing a secondary survey, including ophthalmologists and ear, nose, and throat surgeons. If significant head or chest injuries exist, the patient will be directed to the appropriate surgical specialists in neurosurgical or cardiac critical care.

EXHIBIT 51-4

CLINICAL AND ANESTHETIC CONSIDERATIONS FOR PATIENTS ADMITTED TO THE MILITARY TRAUMA WARD

- The nature of the wounds may not be entirely clear from the signals sent from Role 3, so patients receive a surgical assessment on admission.
- Patients may require preoperative intravenous fluids following extended "nil by mouth" status (surgery anticipated during aeromedical evacuation). Depending on the proposed surgical procedure, patients also may need cross-matching.
- A military pain team that prescribes and monitors multimodal analgesia including neuropathic agents oversees analgesic considerations. When patients arrive, the effectiveness of in-transit analgesia is assessed because continuous peripheral nerve block/epidural catheters may need revision or de novo insertion perioperatively. Patients are subsequently assessed daily on pain rounds¹ (see Figure 51-2).
- A subgroup of patients recently arrived on the ward from the critical care unit may still be high dependency.
- Two military trainees supported by consultant staff manage the patients holistically. Military mental health and regimental welfare services also provide routine support.

(1) Devonport L, Edwards D, Edwards C, Aldington DJ, Mahoney PF, Wood PR. Evolution of the role 4 UK military pain service. *J R Army Med Corps.* 2010;156(Suppl 1):S398–401.

Less severely injured casualties are admitted directly to a trauma ward, where an early review of the patient's wounds is undertaken. Those admitted to critical care are also commonly sent to an operating room within 2 to 8 hours of their arrival to have their wounds inspected. Again, this may be the first procedure in a lengthy series.³

The anesthetic considerations for these two groups are distinct. The essential elements are detailed in Exhibit 51-3 and Exhibit 51-4, including comments (Exhibit 51-4) relevant to patients recently discharged from critical care.

COORDINATING CLINICAL CARE

Military patients are reviewed at a weekly multidisciplinary team ward round. This review occurs in two

parts: (1) a sit-down multidisciplinary team meeting followed by (2) a conventional ward round consisting

of key clinical personnel. The first multidisciplinary team component is attended by more than 20 staff from clinical and support disciplines. Every military patient's overall progress is reviewed, including arrangements for discharge for continued rehabilitation at the Defence Medical Rehabilitation Centre, Headley Court, Surrey.

All NHS and military patients requiring surgery are prioritized twice daily in the "bunker," a secure room within the QEHB main theater complex. At these meetings theater lists and patients are managed so that all necessary urgent and emergency activity continues without affecting normal scheduling.

OPERATING ROOM ACTIVITY

The complex nature of ballistic wounds means that as the patient's condition stabilizes, multiple surgical interventions are the norm. Frequent and often prolonged surgical episodes have implications for operat-

ing room logistics. During February 2010, six military patients were in the operation room for over 10 hours, including one who required 45 hours of surgery, and his operative interventions continued into the next month.

EXTERNAL RELATIONSHIPS

The QEHB is a central component of the UK Role 4, but it cannot work in isolation. Occasionally, clinical issues require discussion between the physicians and care providers at Role 3 and 4 facilities. The joint theater clinical case conference, a secure pan-operational teleconference, is conducted on a weekly basis and facilitates these discussions.

Care at the QEHB precedes the extensive rehabilitation needed for many of the injured personnel subsequently undertaken at the Defence Medical Reha-

bilitation Centre. A further consideration is managing surges in patient activity. The Trust, in conjunction with the Department of Health, has agreements with neighboring trusts to displace patients, if necessary.

New clinical lessons are continually being absorbed, often in coordination with research conducted by the Defence Science and Technology Laboratory, Porton Down, which is translated into practical combat protection and casualty care. The critical relationships between the QEHB and external partners are summarized in Figure 51-1.

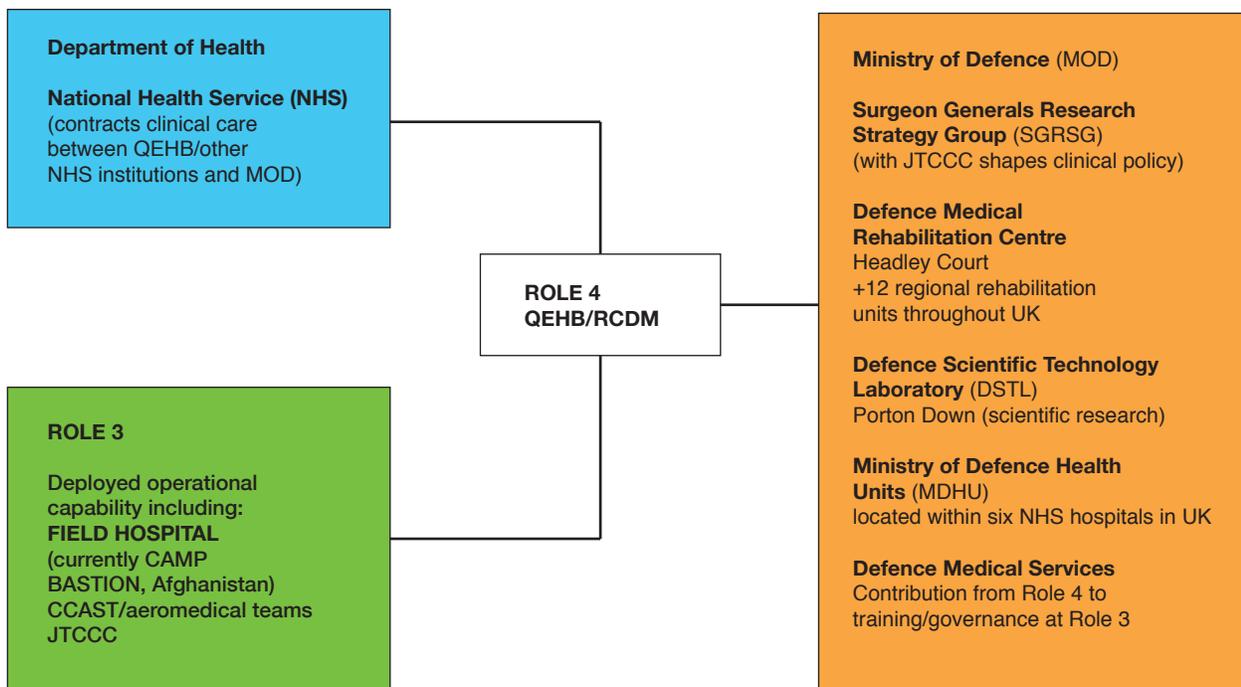


Figure 51-1. Relationship of Queen Elizabeth Hospital Birmingham to external bodies. CCAST: Critical Care Air Support Team; JTCCC: joint theater clinical case conference; RCDM: Royal Centre for Defense Medicine

SUMMARY

Considerable effort is used to manage the complex injuries received at Role 4. A highly experienced multidisciplinary clinical team of NHS and military staff has developed during the years of conflict, and a close relationship exists with the deployed field hospital. The UK National Audit Office has scrutinized the clinical pathway from point of injury through rehabilitation in its report *Ministry of Defence—Treating Injury and Illness Arising on Military Operations*.⁴ This

publication remains one of the most extensive reviews of the care provided to injured UK military personnel. It concluded that overall, the “treatment for seriously injured personnel is highly effective,” which reflects favorably on the contribution from both UK Role 4 elements—QEHB and the Defence Medical Rehabilitation Centre. Future progress will continue to depend on close support and cooperation between civilian clinicians and the defense medical services.

REFERENCES

1. Hodgetts TJ, Mahoney PF, Kirkman E. Damage control resuscitation. *J R Army Med Corps*. 2007;153:299–300.
2. Jones CP, Chinery JP, England K, Mahoney P. Critical care at role 4. *J R Army Med Corps*. 2010;156(Suppl 1):S342–348.
3. Wood PR, Haldane AG, Plimmer SE. Anaesthesia at role 4. *J R Army Med Corps*. 2010;156(Suppl 1):S308–310.
4. National Audit Office. *Ministry of Defence – Treating Injury and Illness Arising on Military Operations*. London, United Kingdom: The Stationary Office; 2010. Report by the Comptroller and Auditor General, HC 294 Session 2009–2010; 10 February 2010.

