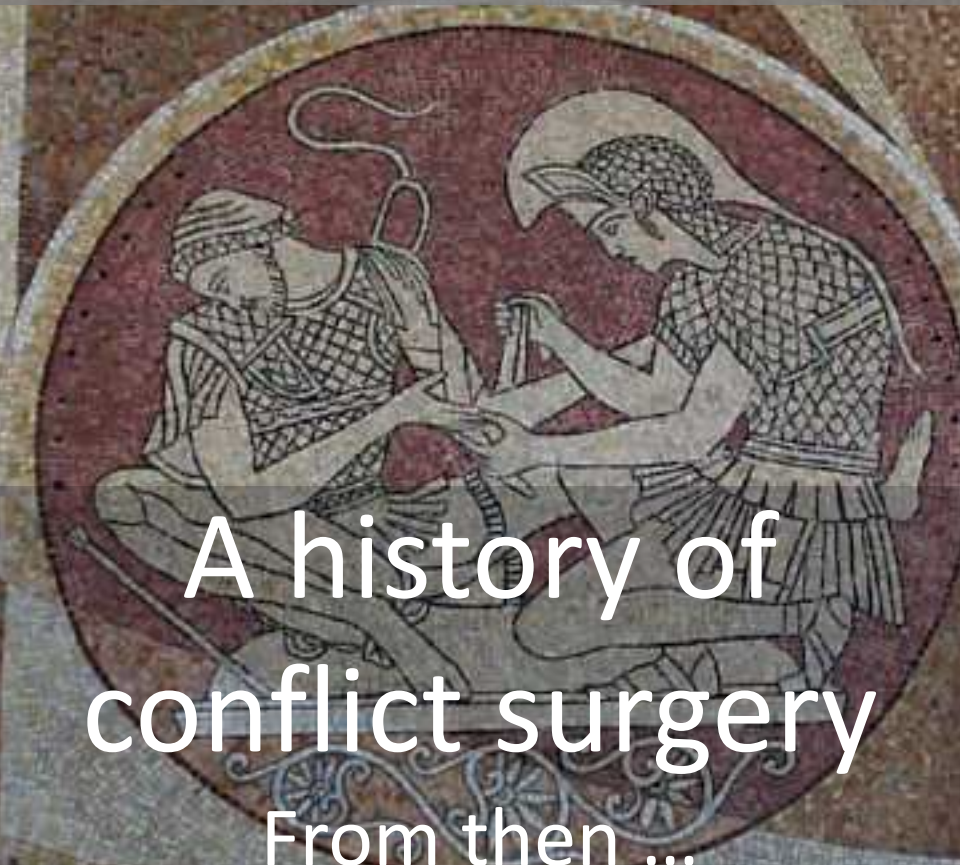


A talk first delivered to the RSM History of Medicine Society, 7 December 2022



A history of conflict surgery From then ...

Col (retd) David Vassallo FRCSEd DHMSA MA L/RAMC
Chairman, Friends of Millbank

Achilles binding wounds of Patroclus, Trojan War



... to now

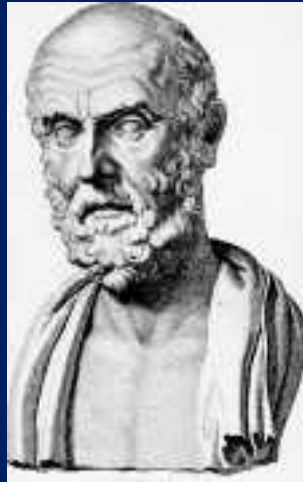
Outline

- Key episodes – war as a catalyst for change
- Key personalities – those who left their mark
- Key innovations
- Specialties born in war
- Key lessons for today
- Some recommended books
- Dedication

There is no substitute for experience

‘He who wishes to be a surgeon should go to war’

Hippocrates (c.460 – 370 BC)



There is no substitute for experience

‘How wide and varied is the experience of the battlefield and how fertile the blood of warriors in raising good surgeons’

Sir Clifford Allbutt FRS, 1898

Regius Professor of Physic, Cambridge

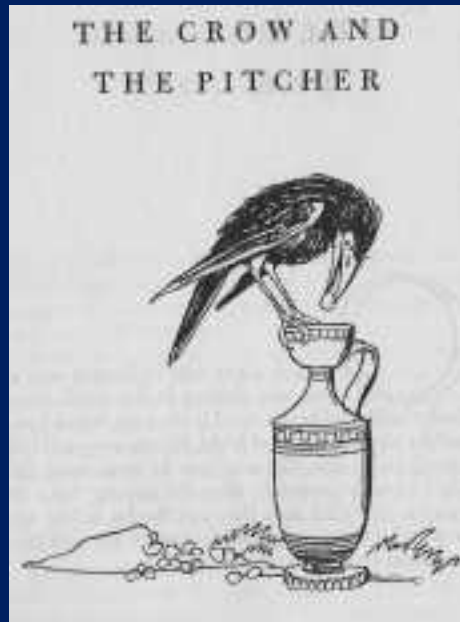
System of Medicine (Cambridge, 1896-1899)

Co-founder with Osler of History of Medicine Section, RSM, 1912

War as a catalyst

Necessity is the mother of invention

Plato's *Republic* (Plato, 428-348 BC)



Aesop's Fables, 6th century BC

War as a catalyst

If anything positive can be said of war, it would be that it serves as a catalyst for rapid improvements in medical understanding and care.

Charles Buckenmaier III, Pete Mahoney

(Combat Anesthesia: the first 24 hours. Borden Institute, 2015)

Uniformed Services University & Royal Centre for Defence Medicine

Ancient times



Trajan's column, Rome (Dacian Wars, 101-102 & 105-106 AD)

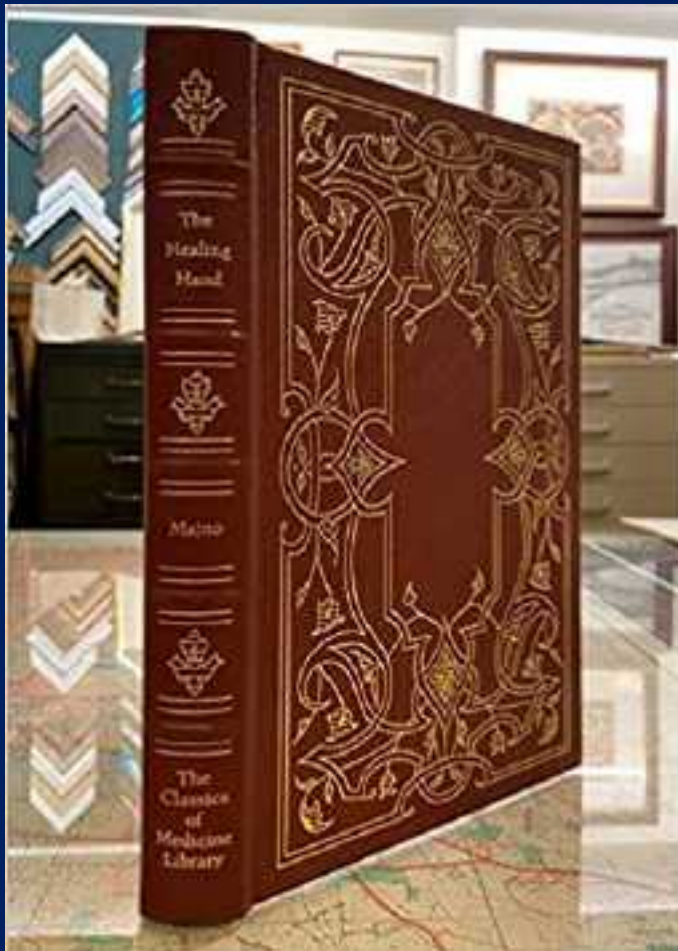
Roman military hospitals



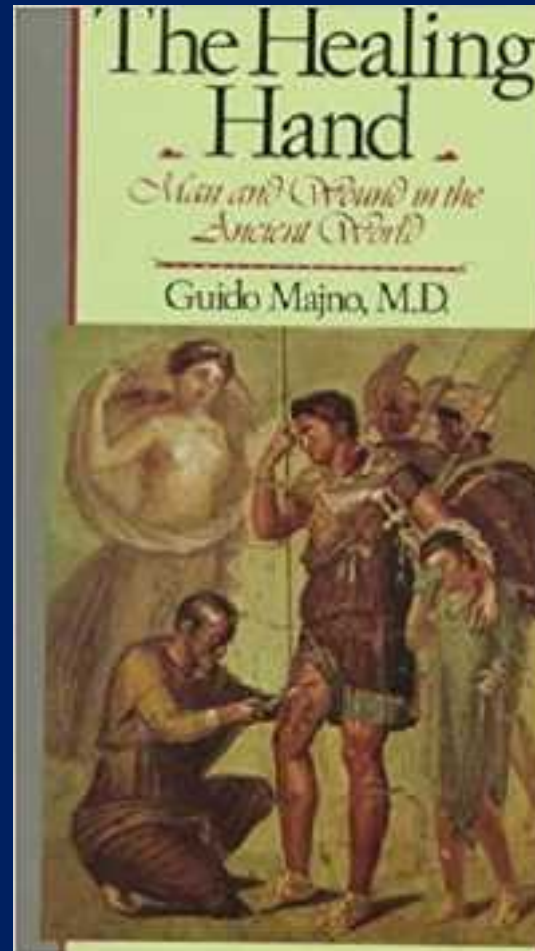
From: Guido Majno. *The Healing Hand* (Harvard University Press, 1975), p.383

Book recommendation

Guido Majno *'The Healing Hand'*



Harvard University Press, 1975



Paperback, 1991

Mesopotamia
Egypt
Greece
Arabia
China
India
Alexander the Great
Rome
Galen

Celsus: The perfect surgeon

*‘Now a surgeon (chirurgus) should be youthful or at any rate nearer youth than age;
with a strong and steady hand which never trembles, and ready to use the left hand as well as the right;
with vision sharp and clear, and spirit undaunted;
filled with pity, so that he wishes to cure his patient, yet is not moved by his cries, to go too fast, or cut less than is necessary; but he does everything just as if the cries of pain cause him no emotion.’*

Celsus, 175 AD

(Greek philosopher, quoted by Majno ‘The Healing Hand’, p.355)

The invention of gunpowder



Tang dynasty, China, 9th Century AD

The EFFECTS of gunpowder ...



Mediaeval 'wound man'



From Hans Gersdorff: *Feldbusch der Wundarztney*, Strasburg 1517

Giovanni di Vigo (1460 – 1525)

‘Wounds made by firearms are poisoned
because of the powder...

To cure, you must cauterise with oil ...
this oil must be applied boiling hot ...’



From 'A Compendious Practice of the Art of Surgery' (Rome: 1514)

Ambroise Pare (1510 – 1590)

‘Je le pansai, Dieu le guérit’

‘I dressed the wound and God healed him’



A veteran of 17 military campaigns, surgeon to four kings of France

Ambroise Pare (Turin, 1537)

‘I was at that time [age 26] a fresh-water surgeon, since I had not yet seen and treated wounds made by firearms... so I took heart to do as they did...

Finally, my oil was exhausted and I was forced instead to apply a digestive made of egg yolk, rose oil and turpentine...

Ambroise Pare (Turin, 1537)

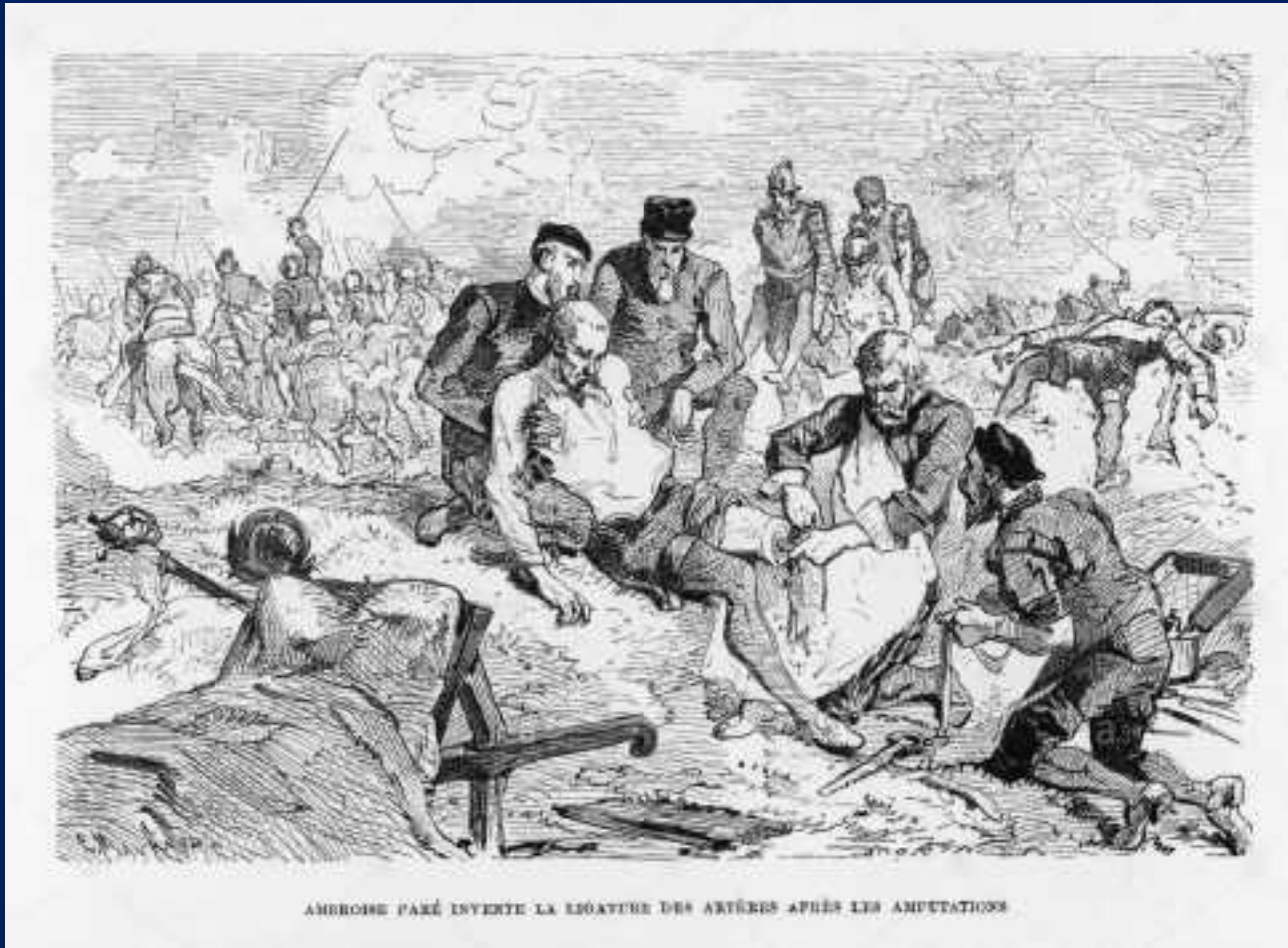
‘This made me get up early in the morning to visit them. There ... I found those on whom I had used the digestive medication feeling little pain in their wounds, without inflammation and swelling...

The others on whom I had used the oil I found feverish, with great pain, swelling and inflammation around their wounds.

Then I resolved never again to so cruelly burn the poor wounded by gunshot.’

‘The method of curing wounds caused by arquebus and firearms’ (1545)

Ambroise Pare – re-invention of ligatures



'Treatise on Surgery' (1564)

Ambroise Pare – functional prostheses



Surgery in the French Revolutionary and Napoleonic Wars (1791-1815)



Painting by Jason Askew: Surgeon Francis Burton, 4th Regt of Foot, at Waterloo

The most famous patient in history ...



Rear Admiral Nelson, life saved by stepson Lt Josiah Nisbet
25 July 1797, assault on Tenerife (Battle of Santa Cruz)

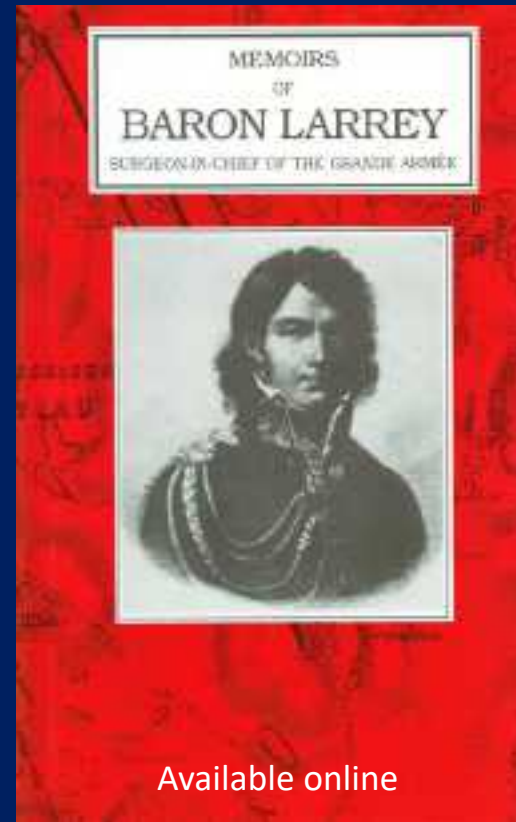
And the most famous amputation ...



‘Admiral Nelson.
Compound fracture of the
right arm
by a musket ball passing
through a little above the
elbow;
an artery divided;
the arm was immediately
amputated.’

Tourniquet used by Surgeon Thomas Eshelby (1769-1811), HMS *Theseus*
(Wellcome Museum)

And (perhaps) the most famous surgeon

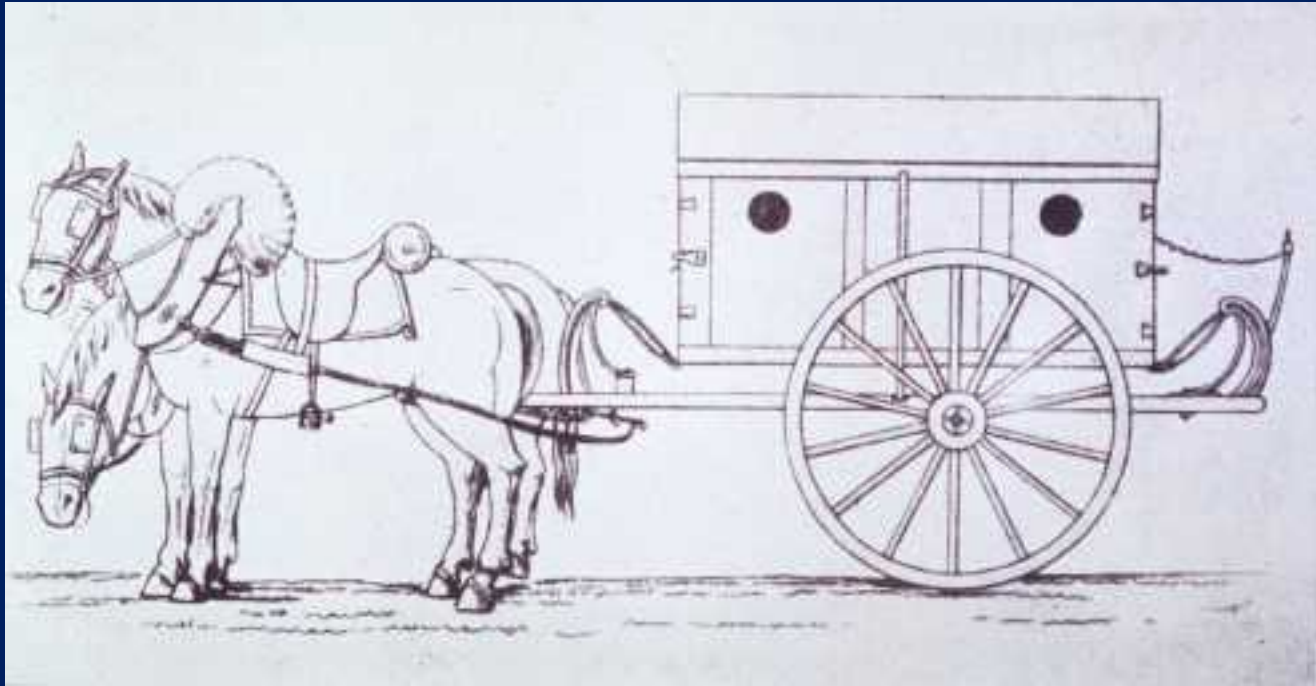


Dominique Jean Larrey (1766 – 1842)

Apprentice [age 13-21], entered Army in 1792 [age 26]

Professor [age 28], Napoleon's Surgeon-in-Chief

Larrey - 'Ambulance volante'



'Triage' – treatment in order of need, regardless of rank or nationality

Surgery at the front line and rapid evacuation in comfort

Decisive to save life - 200 amputations in 24hrs, Battle of Borodino, 1812

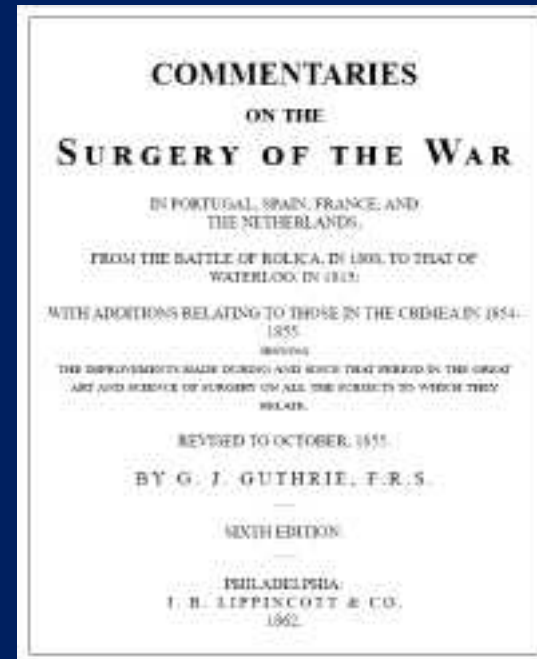
Larrey - Humanity in war

Injured at the battle of Waterloo, 18 June 1815, he was left for dead and then captured by Prussian soldiers.

Sentenced to death, he was recognised by a German physician who had attended his lectures in Berlin.

He was brought before General Blücher who immediately pardoned him because he had previously saved the life of the general's son.

George Guthrie - Wellington's Surgeon



Online at Project Gutenberg

Peninsular War Surgeon 1808 onwards: six years gruelling experience
Haemorrhage control:

Digital pressure over femoral artery

Ligate both ends of torn artery, above and below the injury

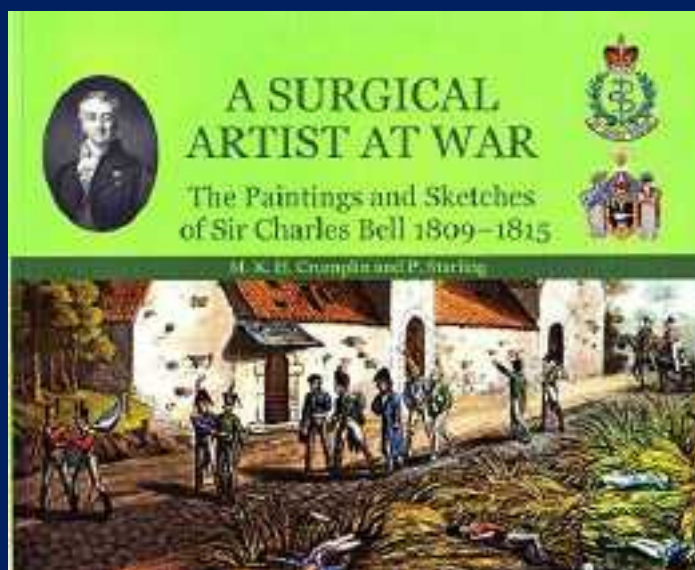
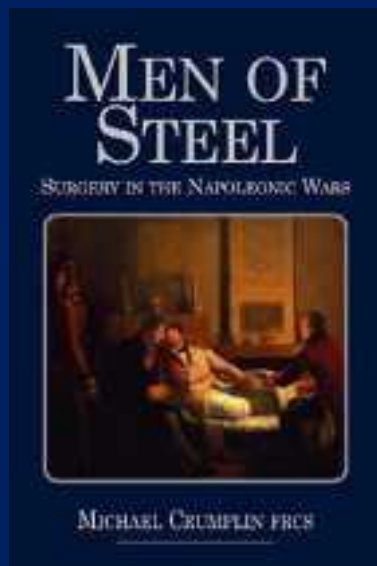
Youngest surgeon ever to become member RCS; elected President RCS three times

See: [Wellington's Combat Surgeon George James Guthrie - The Waterloo Association](#)

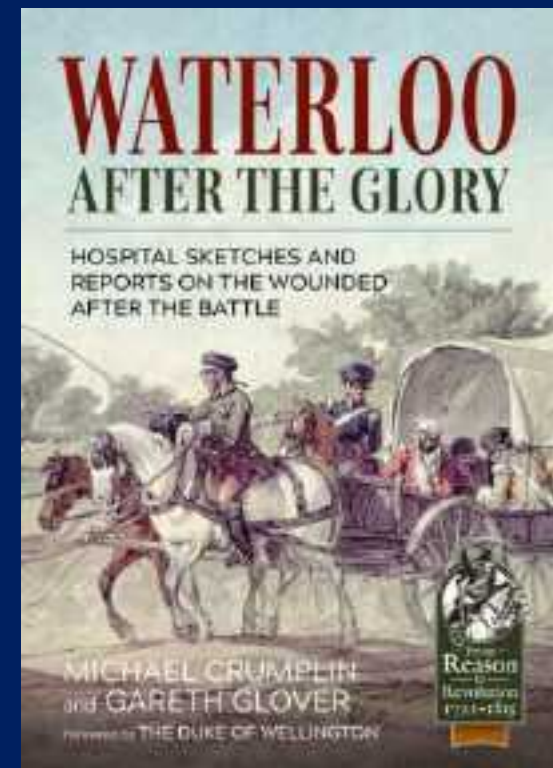
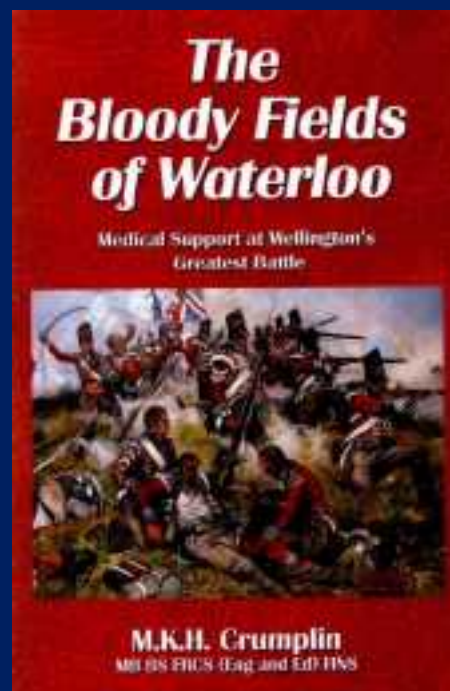
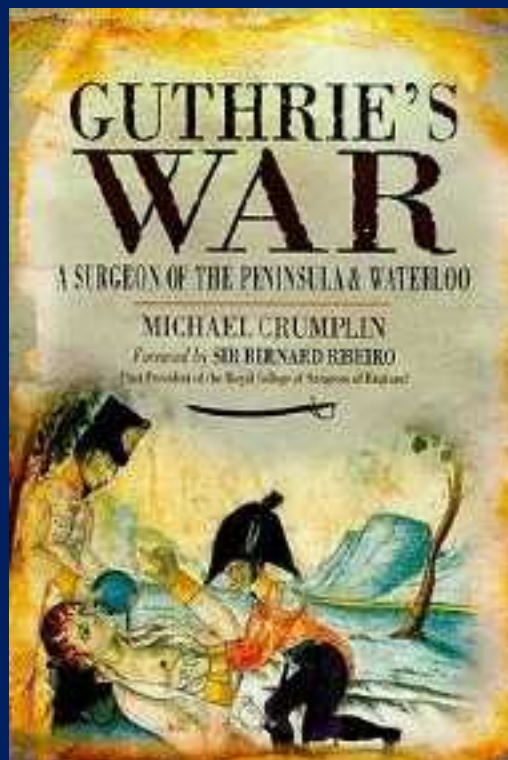
British field hospital at Mont St-Jean, Battle of Waterloo 1815



Also at Hougoumont, La Haye Sainte and Papelotte



Some recommended books



Complications and aftermath of war wounds and surgery





The reality of war surgery

et que rien ne pouvait être plus terrible.
en uitermate afschuwelijk was.

The birth of Anaesthesia (16 October 1846)

‘Gentlemen, this is no humbug’



Gilbert Abbot (patient), John Warren operating, William Morton anaesthetising.
Massachusetts General Hospital, Boston

Crimean War (1853-1856)



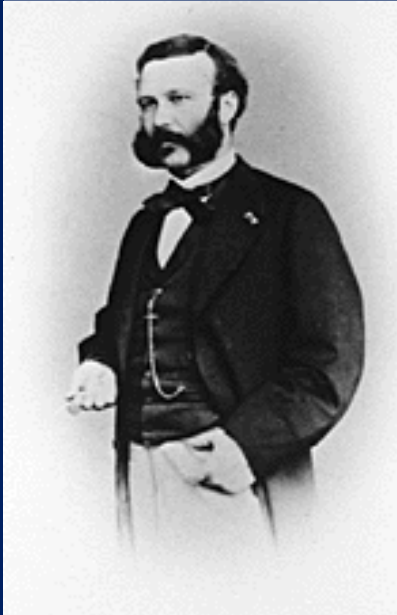
Crimean War: removing the wounded from the Redan. Wood engraving by E.A. Goodall. [Wellcome Collection](#).

Crimean War (1853-1856)

- First use of anaesthesia in wartime
- Florence Nightingale
 - Re-organisation of military medical services
 - Revolutionised training of Nurses
- Catalyst for formation of Army Medical School
(Fort Pitt, Chatham (1860), then Netley (1863) and later at Millbank (1907))

Battle of Solferino, 24 June 1859

(French & Sardinians vs Austrians: 40,000 casualties)



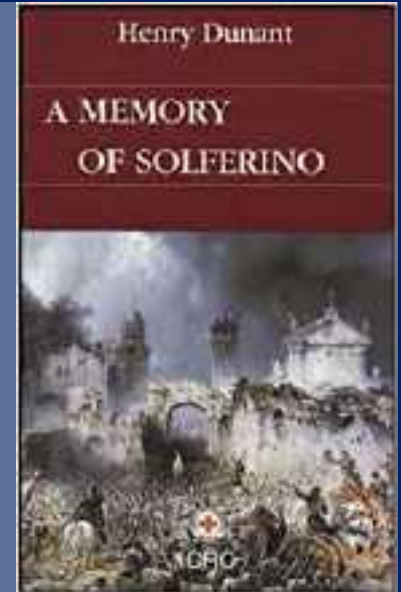
'A memory of Solferino' 1862

Foundation of the ICRC 1863

First Geneva Convention 1864

Four Geneva Conventions of 1949

Two additional Protocols of 1977



(Protection for the Wounded and Sick in Conflict, and of those who care for them)

Humanity in war

A wounded enemy is no more an enemy,
but a comrade in need of help

Bernhard von Langenbeck
(Surgeon, Austro-Prussian War 1866;
Franco-Prussian War, 1870 – 1871)



Red crescent first used in Russo-Turkish war, 1876-1878

Antisepsis

(The dawn of a new era, 12 August 1865)



Joseph Lister dressing and splinting a compound fracture, Glasgow. Bettmann Archive.

Antisepsis

Franco-Prussian War (1870 – 1871)

- First conflict where Lister's antiseptic principles (Lancet, 1867) were put into use
- Lister J. A Method of Antiseptic Treatment Applicable to Wounded Soldiers in the Present War. *Br Med J.* 1870, Sep 3, pp.243-244

Anglo-Boer War (1899 – 1902)



First-aid treatment at the Battle of Colenso, December 1899. By JJ Waugh. Getty Images

Anglo-Boer War (1899 – 1902)

- More soldiers died of typhoid than of wounds
(Conan Doyle: Café Enterique, Boulevard des Microbes...)
- Most GSW due to Mauser bullets at long range
- Dry hot sandy veldt – wrong lessons learned

Abdominal cases: strictly conservative treatment

William McCormack, Consultant Surgeon to South African Field Force:
advice based on observations on survivors in base hospitals

Good results from Listerian antiseptic technique

First World War



First World War

- Industrialised killing in fertile fields of Flanders
- Horrendous effects of high explosive missiles and multiple high energy transfer wounds
- Severely contaminated massive wounds, often involving bones and joints

A war of Orthopaedic surgery ... (Sir Berkeley Moynihan)

First World War

- There is no substitute for experience ...
- Lessons learned:
 - Haemorrhage is the killer, infection follows ... act fast
 - Forward resuscitation and surgery (Casualty Clearing Stations)
 - Urgent wound excision (and leave dressings undisturbed)
 - Delayed Primary Closure
 - Immobilisation of femoral fractures
 - Blood transfusion
- The birth of new specialties ...

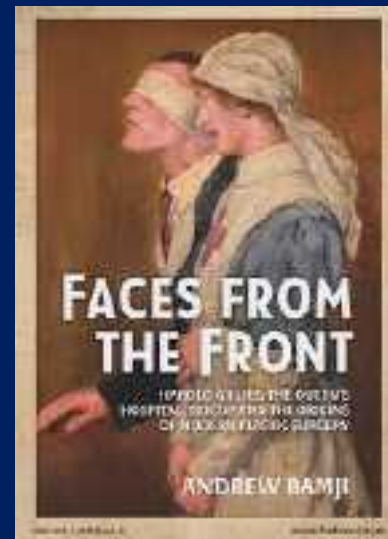
The new specialties

- Plastic surgery: Harold Gillies
- Orthopaedics: Robert Jones
- Neurosurgery: Harvey Cushing, Victor Horsley
- Cardiothoracic surgery ...

Plastic surgery in the Great War



Harold Gillies



Orthopaedics - Life-saving innovation

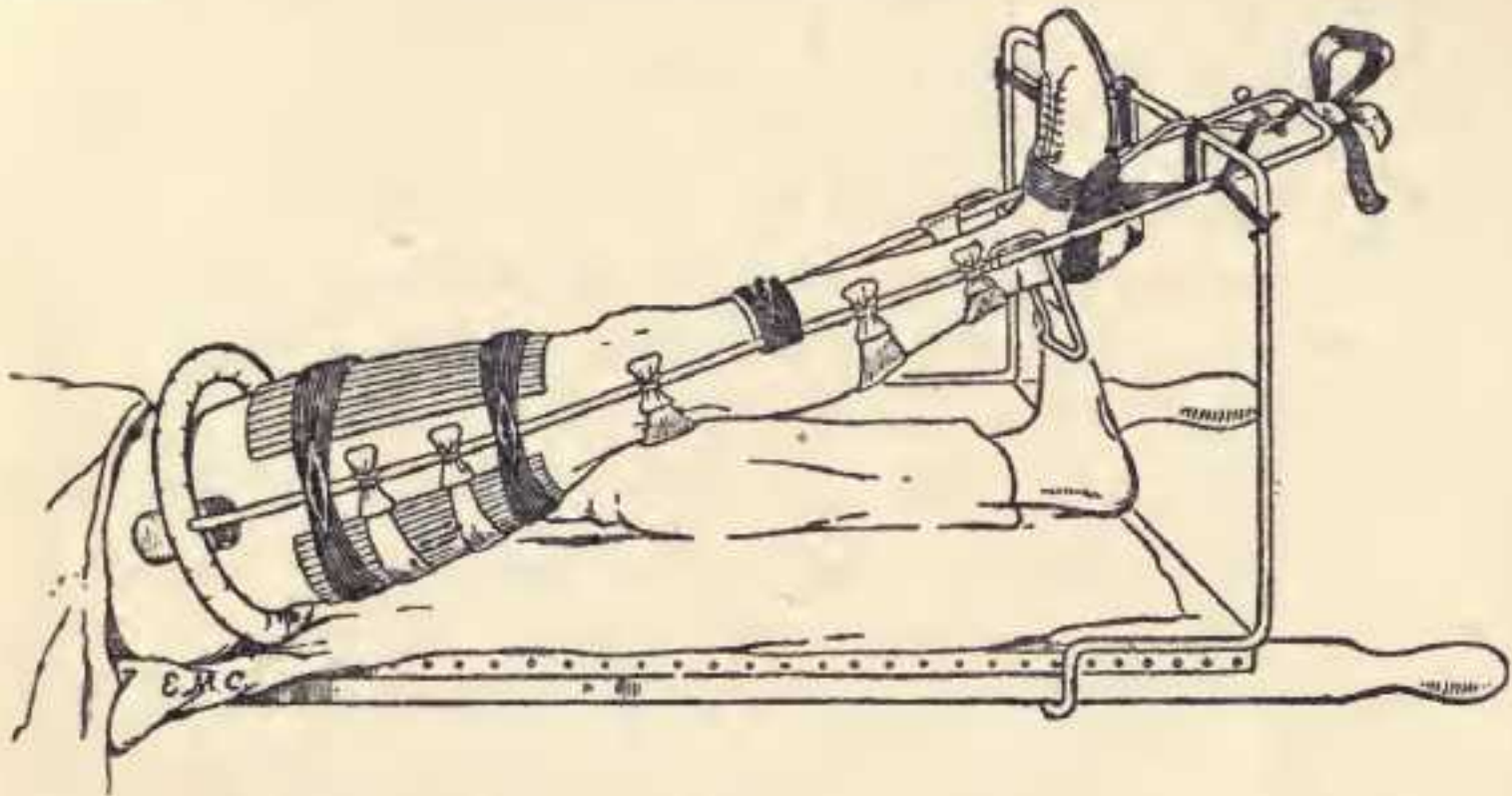
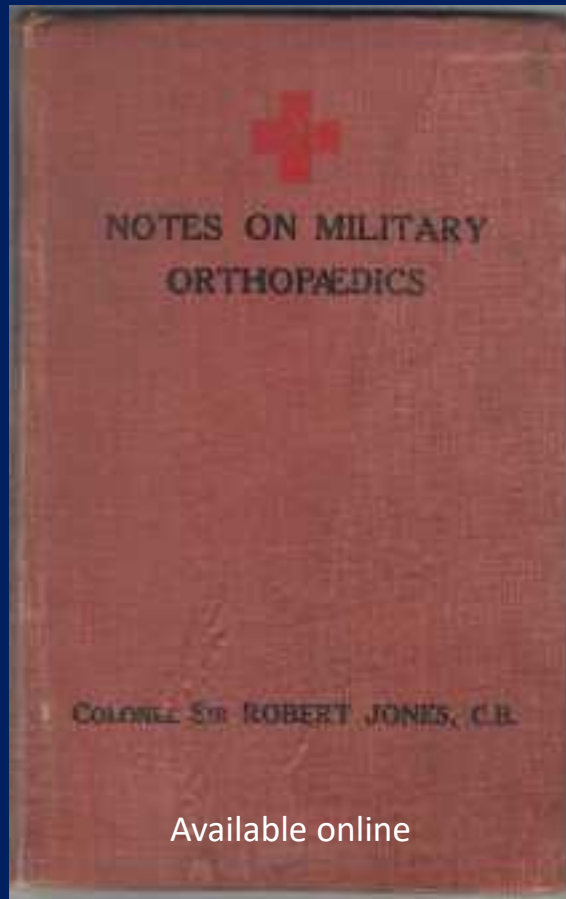


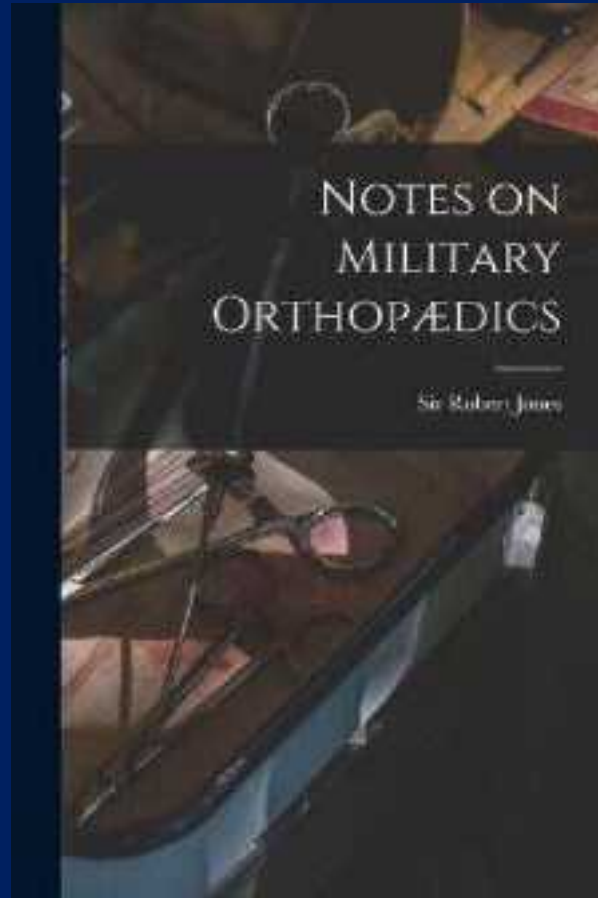
FIG. 17.—Thomas knee splint as applied on the field for compound fracture of the femur. (From official circular.)

Notes on Military Orthopaedics

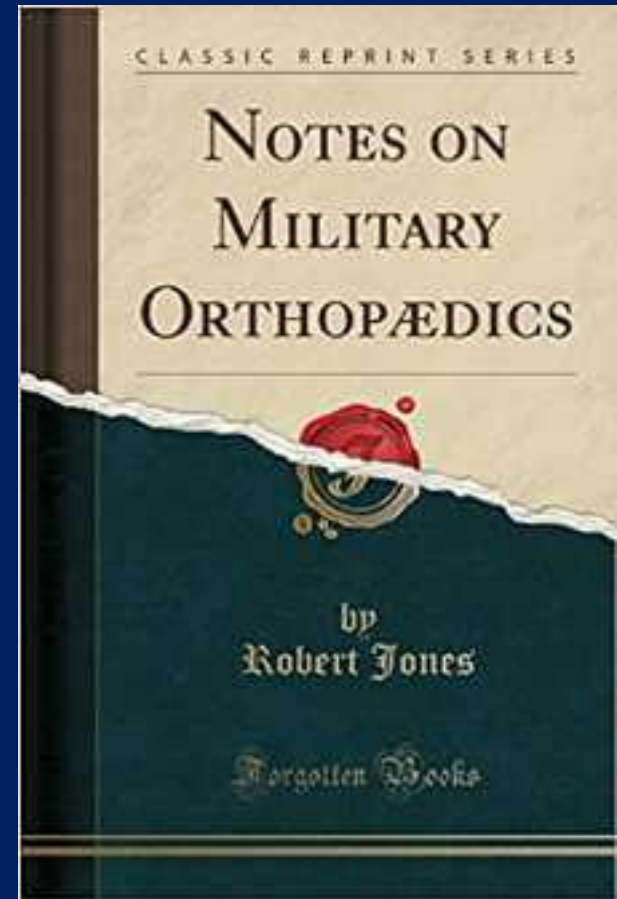


Available online

1917

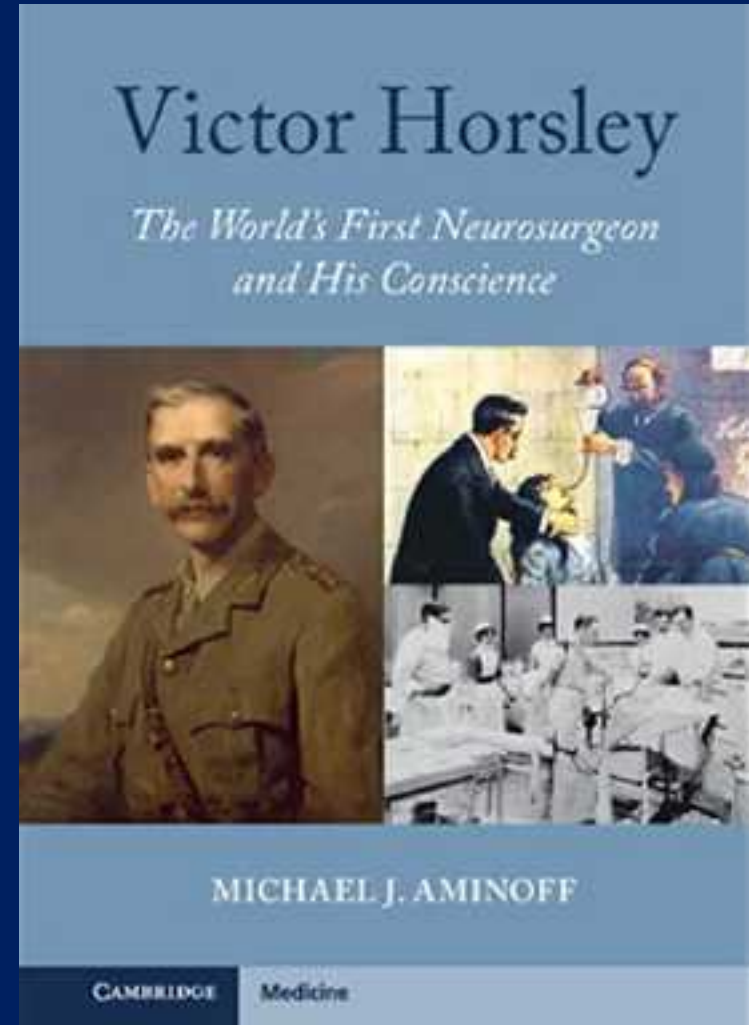
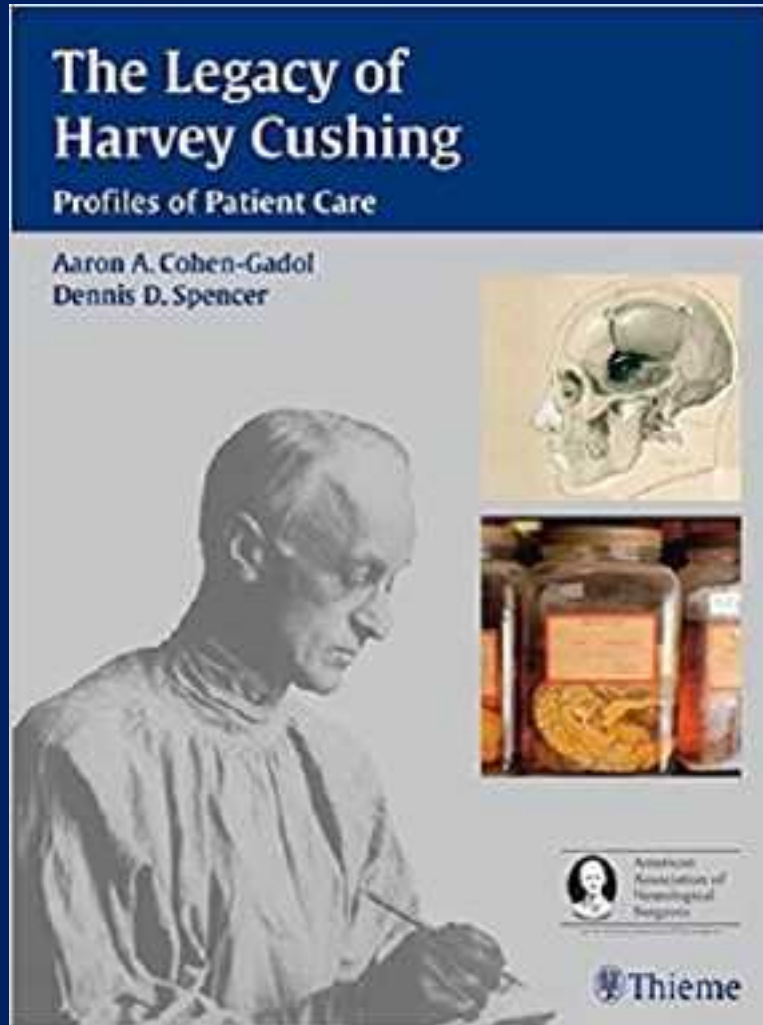


Colonel Sir Robert Jones CB
Inspector of Military Orthopaedics, AMS



2019

Neurosurgery in the Great War

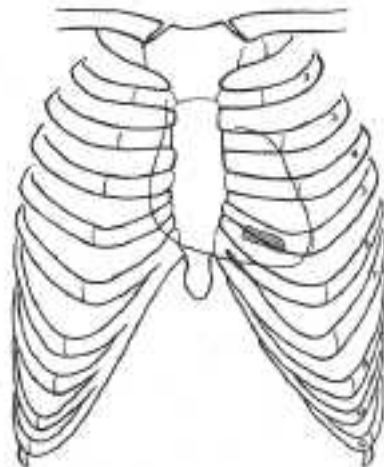


Cardiothoracic surgery in WW1

A CASE OF REMOVAL OF A RIFLE BULLET FROM THE RIGHT VENTRICLE OF THE HEART.

By DR. MARGUERITE WHITE,
*Attached Royal Army Medical Corps;
Surgical Specialist to St. Elmo Hospital;
Assistant Surgeon to the Carl Beck North Chicago Hospital Clinic.*
AND
COLONEL SIR CHARLES BALLANCE, K.C.M.G.
Army Medical Service.

THOMAS M., aged 21, was wounded by a bullet on November 14, 1917. He rode some miles to the nearest dressing station and then collapsed. On examination it was found that the bullet had passed through the upper part of the right arm behind the humerus, and then entered the right chest between the fourth and



The Bradshaw Lecture

ON THE

SURGERY OF THE HEART

DELIVERED BEFORE THE ROYAL COLLEGE
OF SURGEONS, DECEMBER 11th, 1919

BY

SIR CHARLES A. BALLANCE

K.C.M.G., C.B., M.V.O., M.S. LOND., F.R.C.S. (Eng.)
DEPARTMENT OF SURGERY, ST. GEORGE'S HOSPITAL, LOND.

MACMILLAN AND CO., LIMITED
ST. MARTIN'S STREET, LONDON

1920

Cardiothoracic surgery in WW1

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Women surgeons in WW1

Women's Hospital Corps:

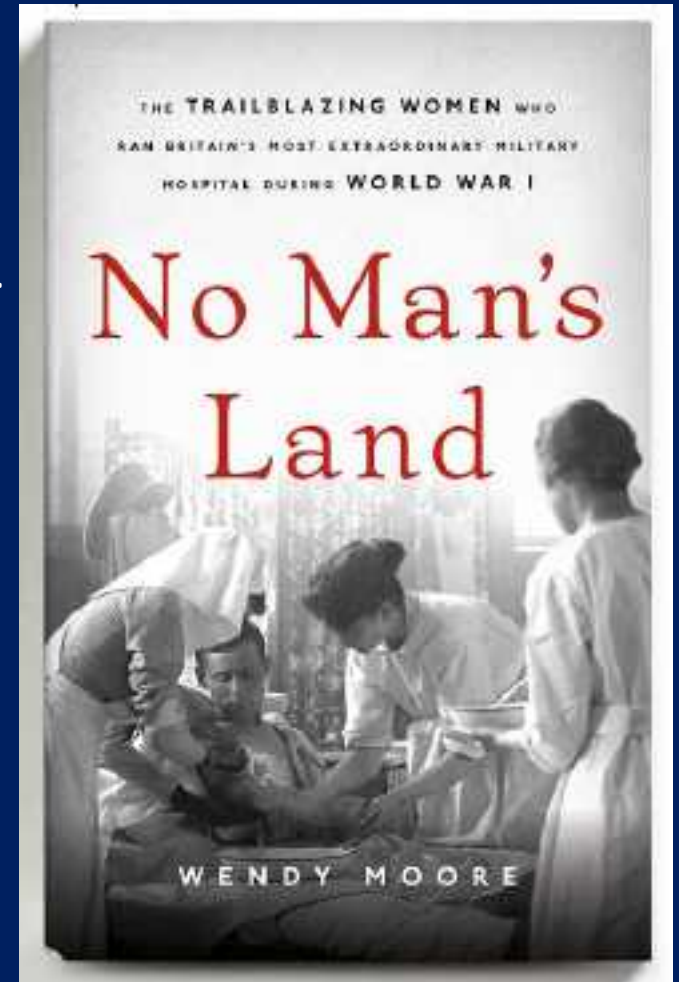
Paris & Wimereux (Sep 1914 – Jan 1915)

Endell Street Hospital, London 1915-1919

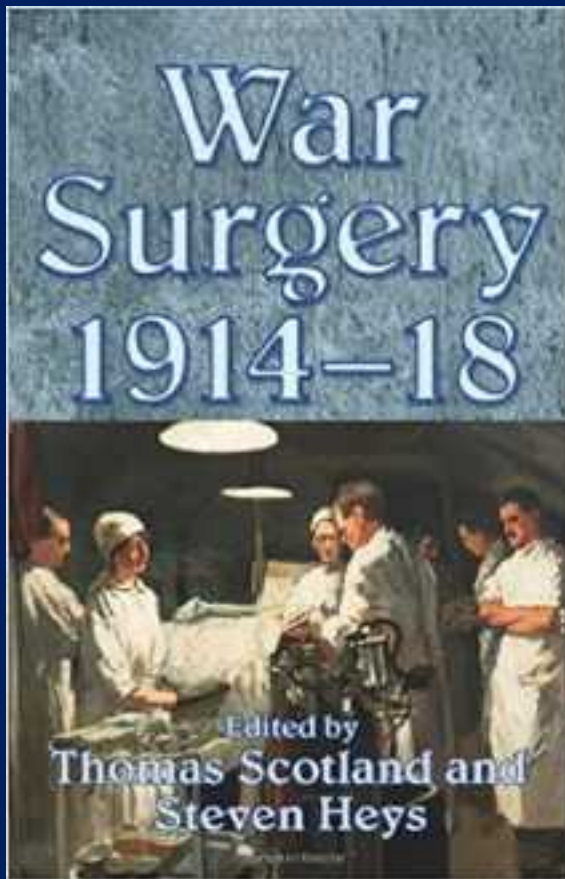
Scottish Woman's Hospitals: France 1914, Serbia 1915...

Women's Medical Unit RAMC: Malta

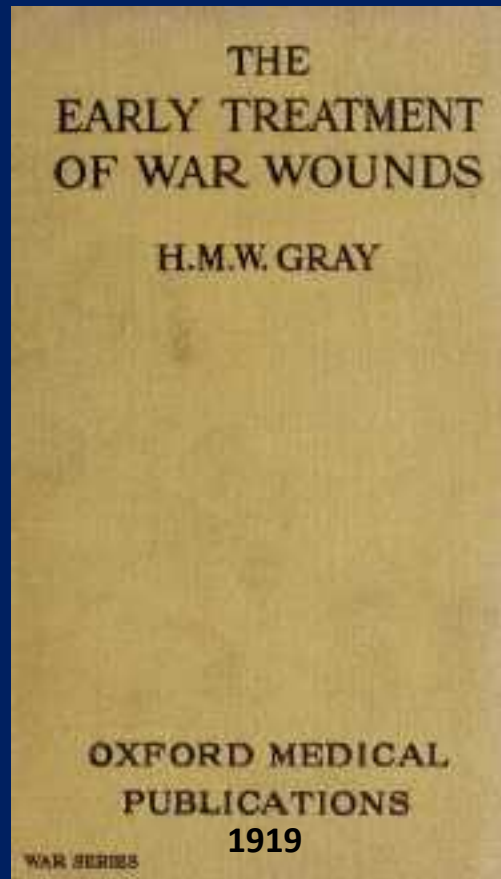
(82 women doctors arrived Aug-Nov 1916)



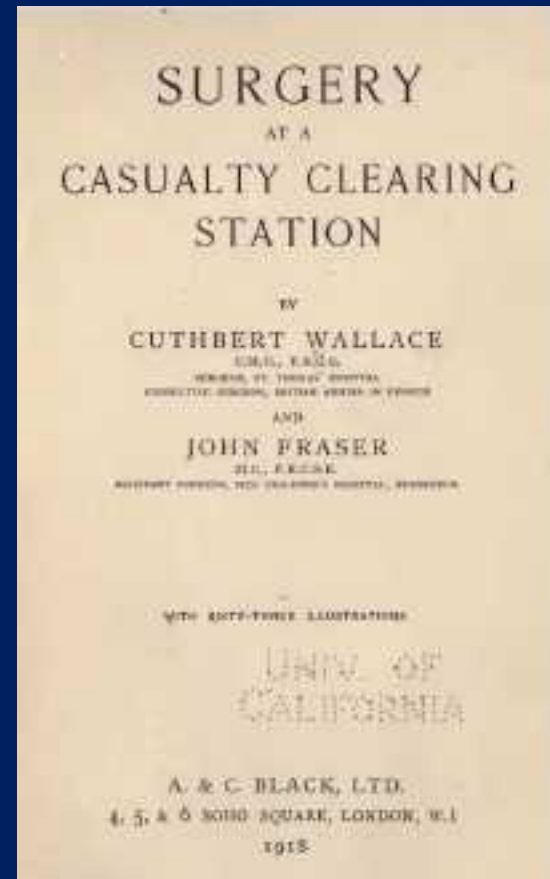
Some recommended books



Published 2012



Available online



Available online; and as reprint

Remember those lessons!

Haemorrhage is the killer

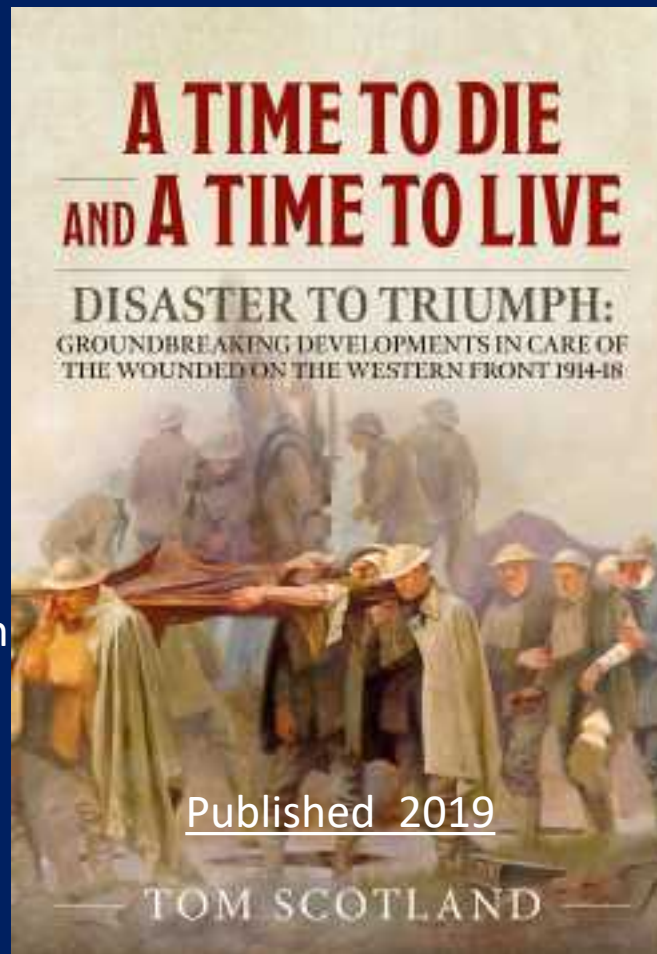
Prevent Sepsis

Forward surgery & resuscitation

Control haemorrhage

Early wound excision

Delayed primary closure

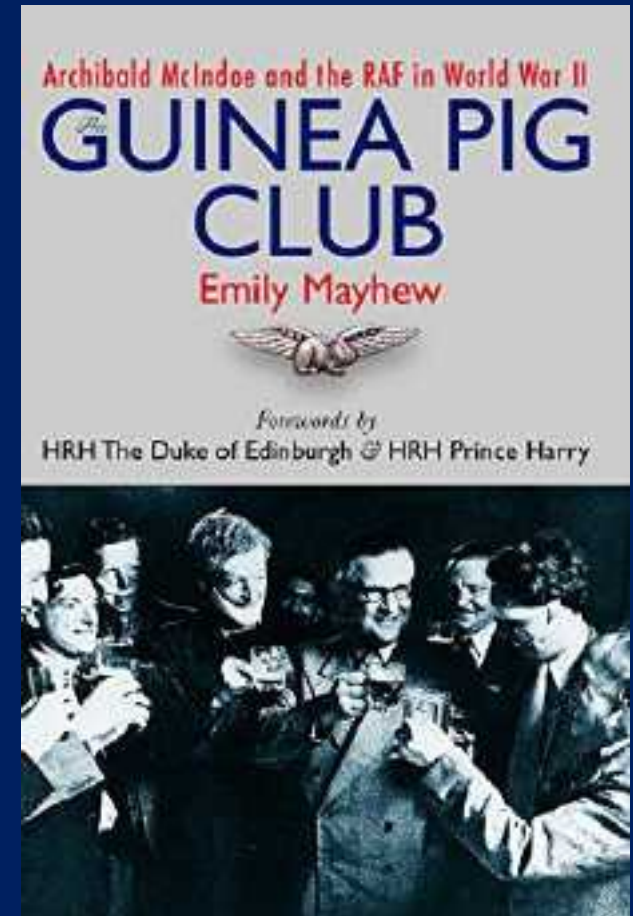
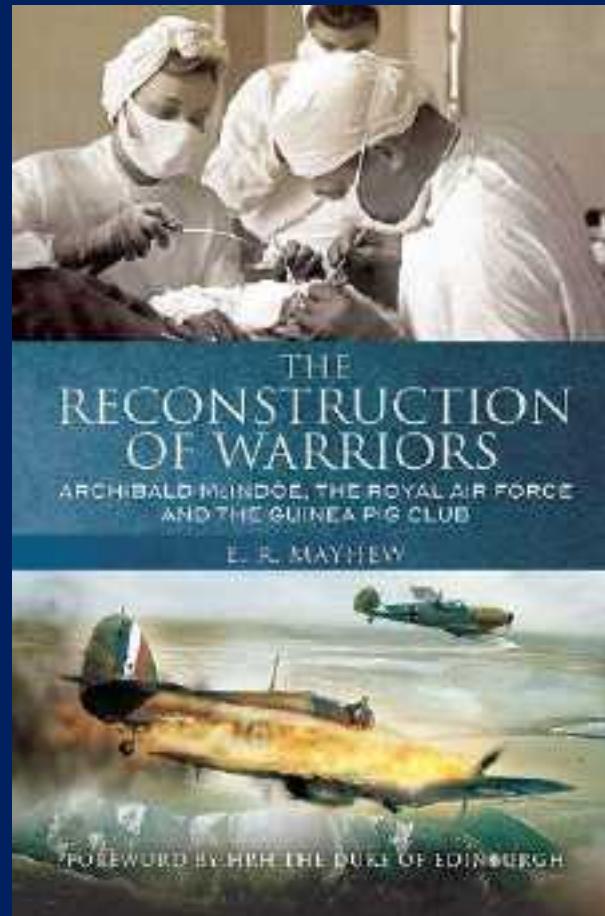
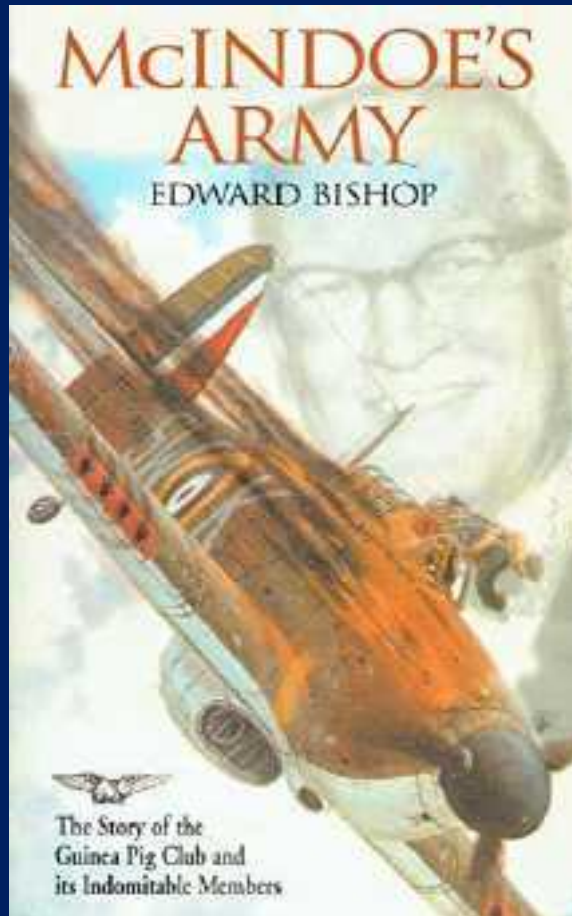


Highly recommended

Second World War

- Consolidation of lessons from the Great War
 - Haemorrhage is the killer, infection follows ... act fast
 - Forward resuscitation and surgery
 - Early wound excision (and leave dressings undisturbed)
 - Delayed Primary Closure
- Blood Transfusion (storage and distribution)
- Introduction of antibiotics
- Growth of specialties:
 - Plastic surgery: Sir Archibald McIndoe (Guinea Pig Club)

Plastic Surgery in the Second World War



Korean War – and vascular surgery



Modern Conflicts (Iraq and Afghanistan)



Battle Mist – painting by Stuart Brown

The paradigm shift in military medicine

- 1970s paradigm: ABC (blunt trauma; ATLS 1977)
- 2005: Paradigm shift (Iraq war)

1st impetus: Mogadishu, 1993

2nd impetus: Iraq, 2003

Catastrophic haemorrhage is the main killer on the battlefield

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Catastrophic haemorrhage is the main killer on the battlefield

ABC to <C>ABC

Battle Mist – painting by Stuart Brown

A detailed painting depicting a military medical scene inside a helicopter. Several soldiers in combat uniforms and helmets are focused on treating a wounded soldier lying on a stretcher. The scene is illuminated by warm, orange light, possibly from a fire or explosion outside. Medical equipment, including an IV drip and a tray of supplies, is visible. A rifle lies on the floor in the foreground. The overall atmosphere is one of urgency and professionalism.

<C>ABC

Military Medical Revolution

Three tests for revolution (transformation!)

- Do military [medical] forces look fundamentally different?
- Are the processes of 'battle' different?
- Are [clinical] outcomes different?

Timothy Hodgetts, 2012

(after Cohen, 2004)

1. Doctrinal and conceptual revolution

- Care on the battlefield (Care under fire...)
- Tourniquets – yes, no, or how?
- En-route care (Medical Emergency Response Team)
- Damage control resuscitation (Surgery is part of Resus)
- Haemostatic resuscitation (massive transfusion protocols)
- Right turn resuscitation
- Aeromedical evacuation – Critical Care en route

Tourniquets: yes, no, or how?



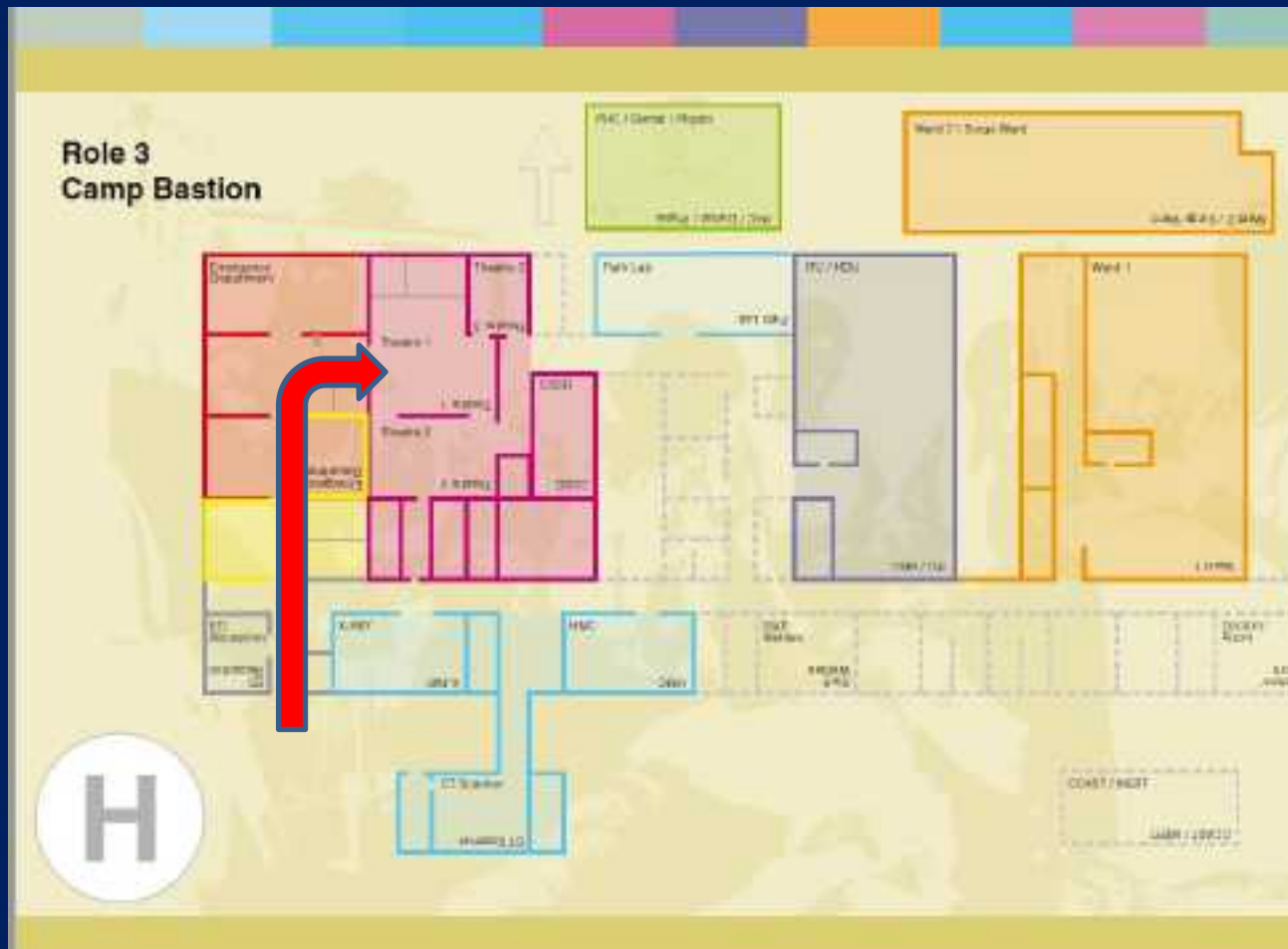
Tourniquets: yes, no, or how?

- Tourniquets save life – Nelson (right arm, 1797)
- WW1 & WW2: ineffective equipment
- 1990: Tourniquets 'only as a last resort', WW2 equipment
- 2001: Very few soldiers had tourniquets, no haemostatic dressings available
- From 2006: Every UK soldier issued with tourniquets (CAT) & haemostatic dressings; pelvic binders introduced

‘Surgery is part of resuscitation’

Damage control

and ‘Right turn resuscitation’



2. Technological Revolution

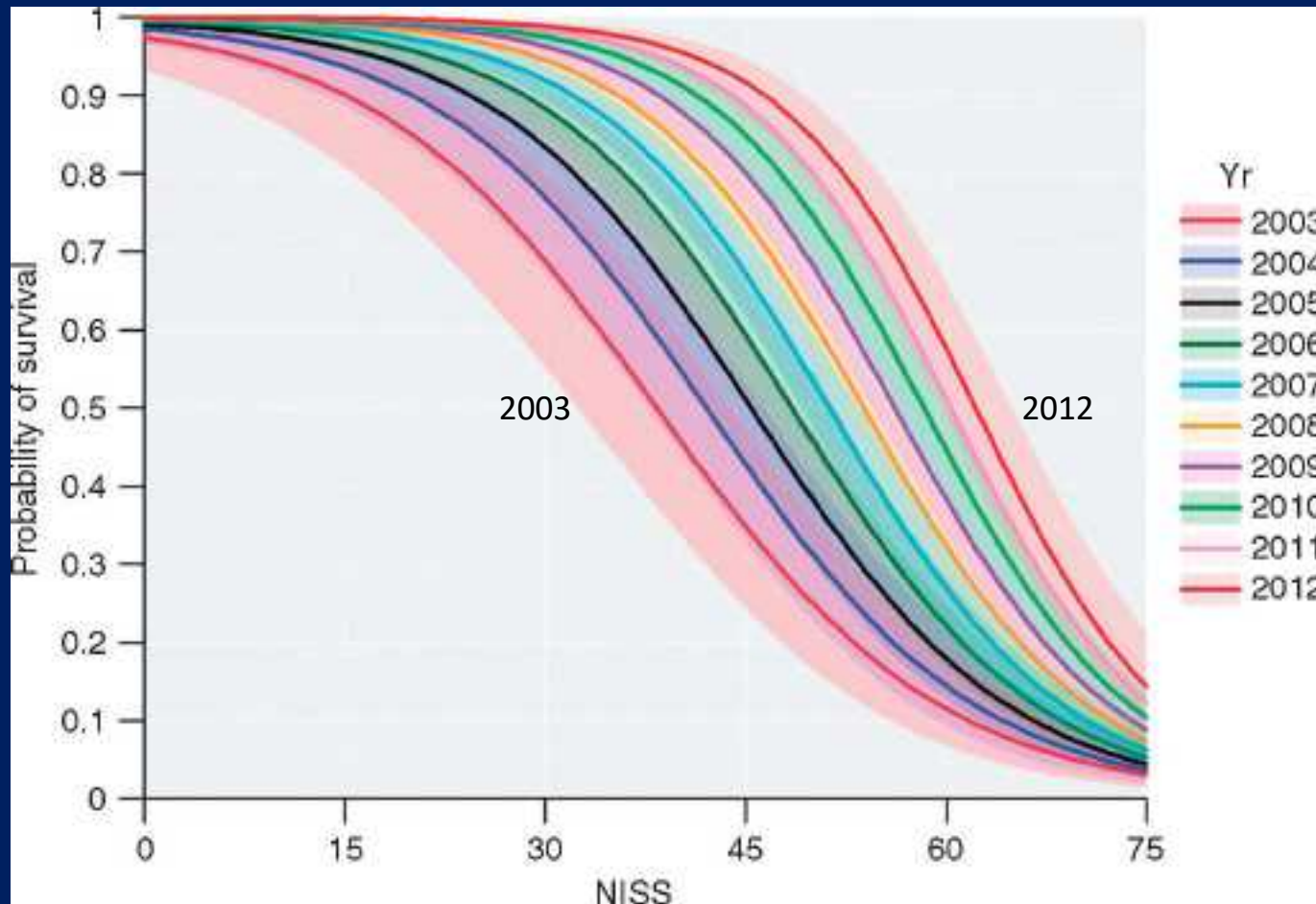
- Haemorrhage control
- Transfusion advances
- Damage control radiology
- Personal protective equipment
- Prosthetics and rehabilitation
- Analgesia

3. Organisational & Operational Revolution

- Embracing clinical governance (audit & review)
- Capturing data – Joint Theatre Trauma Registry
- Operational feedback – Joint Theatre Clinical Case Conference
- Deployed Medical Director
- Multinational collaboration

The crucial question:
Are [clinical] outcomes different?

Afghanistan – the unexpected survivors



Year on year improvement in predicted probability of survival

The CASEVAC Club



Sustaining Revolution

- Civilian adoption of military innovation
- Promoting military medical research
- Transforming after conflict
- Role 4 care embedded in civilian practice

UK Powerhouses of revolution

- HOSPEX Trainer: realistic simulation training
- Deployed Hospital Care: Bastion Hospital
- Role 4 and Royal Centre for Defence Medicine
- Rehabilitation: Headley Court / Stamford Hall
- Mental health: King's College (KCMHR)
- Research: Imperial College & Blast Injury

The challenge

Learning the lessons of conflict in preparation for today's wars
... and the next

Simulation - a substitute for experience?

Preparing for war: The HOSPEX trainer





'Military Medical Revolution'
A book available from The Museum of Military Medicine

Military Medical Revolution

How the UK's Defence Medical Services transformed in conflict, 1990–2015

Colonel David Vassallo FRCSEd MA L/RAMC

Two recommended books

MILITARY MEDICINE IN IRAQ AND AFGHANISTAN A COMPREHENSIVE REVIEW



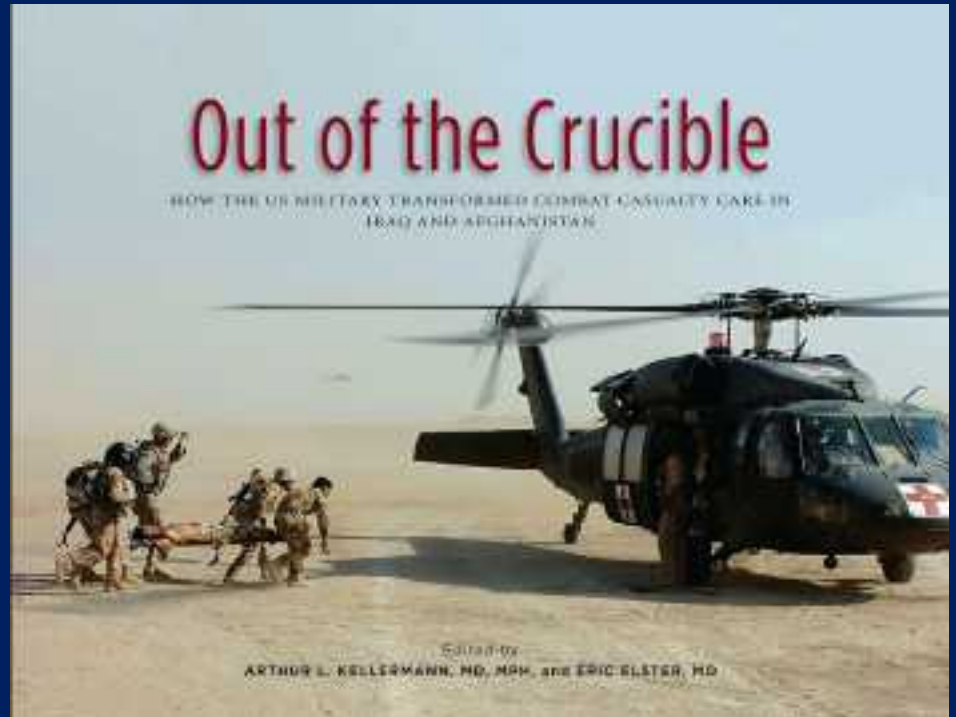
EDITED BY
IAN GREAVES



UK perspective. Published 2018

Out of the Crucible

HOW THE US MILITARY TRANSFORMED COMBAT CASUALTY CARE IN
IRAQ AND AFGHANISTAN



EDITED BY
ARTHUR L. KELLERMANN, MD, MPH, and ERIC ELSTER, MD

US perspective. Published 2018
See also: Borden Institute Textbooks

Remember those lessons!



Where to next?



**This talk is dedicated to the victims of war
and to those who care for them**

