
COMBAT ANESTHESIA: THE FIRST 24 HOURS



The Coat of Arms
1818
Medical Department of the Army

A 1976 etching by Vassil Ekimov of an original color print that appeared in *The Military Surgeon*, Vol XLI, No 2, 1917

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COMBAT ANESTHESIA: THE FIRST 24 HOURS

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Foreword

I am pleased to present this volume, entitled *Combat Anesthesia: The First 24 Hours*, published by the Army Medical Department's Borden Institute. The Borden Institute, part of the Army Medical Department Center and School, is the primary outlet for scholarly and peer-reviewed publications describing observations made and science conducted by the healthcare providers who take care of our Nation's Service Members and Veterans. The Institute's publications do not necessarily represent Army doctrine or the opinion of the Department of Defense or the Army; nevertheless, they represent our providers best work as they seek to inform future policy and decision-making.

This book focuses on anesthesia care during the 24 hours following battle wounds. It is written by British and American physicians who began this collaboration while providing acute care to injured Soldiers of both countries at Camp Bastion and Fort Leatherneck in the Helmand province of Afghanistan. These authors, having deployed throughout Afghanistan and Iraq, address the ways in which care was delivered by U.S. and British trauma teams working together and sharing their competence. This is a story of how these expert physicians organized care and improved in-hospital patient outcomes. The principles presented in this book are also relevant to trauma care in non-military hospitals in the United States, Britain, and beyond.

Looking back, the start of modern military anesthesia can be linked to the expansion of the role of anesthesiology in the post-Vietnam War era. Since then, many of the medical tools have evolved, enhancing the way we care for the trauma patient today. Airway management, vasopressor drug therapy and initiatives in resuscitation, and an array of antibiotic regimens are examples of advancement in acute trauma care over these years. Surgery and postoperative care are now safer and more reliably associated with better patient outcomes. Continued development in these clinical areas has allowed anesthesia providers to provide wounded Soldiers a level of care previously unattainable.

No one individual or group of practitioners is solely responsible for improved survival rates over the course of the war in Iraq and Afghanistan. Combat casualty care begins at the point of injury with the Combat Medic and continues with the collaborative teamwork of all military medical personnel, including technicians, nurses, physicians, and other medical specialists. With the growing experience in the acute care of wounded patients and the implementation of newer technologies during the wars in Iraq and Afghanistan, the survival rates of wounded Service Members has dramatically improved, from 83% (in 2002) to 92% (in 2014). This achievement is a direct result of jointly coordinated efforts by an entire team of military medical personnel.

I congratulate the authors on this collaborative effort, and I admire them for building a strong professional bridge between our countries through the practice of medicine. These officers recognized the importance of continuing, and then strengthening, the relationship formed in the operating rooms during the last 13 years of conflict. I recognize this effort as an important part of the tradition of military medicine, that is, presenting the lessons learned and preserving this knowledge for the next generation of military providers caring for our Service Members injured in combat. Whether the trauma care provider is a physician, nurse, or Combat Medic, the ensuing chapters of this text will serve as a valuable resource in documenting these lessons.

Serving to Heal . . . Honored to Serve!

Patricia D. Horoho
Lieutenant General, US Army
The Surgeon General and
Commanding General,
US Army Medical Command

Washington, DC
December 2014

Prologue

Surgeons rely on the capabilities of their anesthetist colleagues to ensure that complex procedures can be undertaken safely and successfully. This is no less the case during care for critically wounded patients from the battlefield, when surgical prowess requires the highest caliber of anesthesia. The advances achieved by multinational anesthesia teams in Iraq and Afghanistan over the last dozen years have changed thinking not only in the military but also in civilian practice. The authors of this text have drawn on their experiences in sustaining the physiology of the severely injured during prehospital transit, delivering a stabilized patient to the waiting surgical teams and improving survival chances. They have developed direct theater access and novel resuscitation and transfusion protocols aided by thrombo-elastography, which have become accepted civilian protocols. The military patient, however, may need to travel many thousands of miles to return home. Ensuring en-route pain relief with local anesthetic infusions that tolerate in-flight pressure changes has helped deliver patients pain free to the final hospital destination in the home country. Such practice is supported by research to develop an evidence base, and the authors have drawn on research from both sides of the Atlantic to underpin their knowledge. This ongoing research must remain vital for the future development of military anesthesia, even after the end of major conflict.

I have operated on the almost moribund at the multinational trauma hospital in Camp Bastion, Afghanistan. Patients who might not have survived 10 years ago, some with multiple injuries including triple limb amputation, are now carefully resuscitated and deftly anesthetised while their disrupted physiology is gradually restored. The depth of experience of our dedicated military anesthetic teams is distilled in this book, which will be of benefit to our civilian colleagues working in trauma hospitals as well as military providers in future conflicts. I would like to take the opportunity, on behalf of all military surgeons, to thank our anesthetist colleagues for the superb support they have provided to the great benefit of our patients.

Surgeon Rear Admiral Alasdair J. Walker, OBE, QHS, FRCS
Director, Medical Policy & Operational Capability, HQ Surgeon General

Lichfield, United Kingdom
October 2014

Preface

The genesis for this book began as a conversation between medical officers and anesthesiologists from different coalition countries in a tent in Camp Bastion, Afghanistan. The officers were discussing the advances in battlefield anesthetic care that had been achieved in the Iraq and Afghanistan conflicts, and the need to preserve this knowledge for the next generation of military anesthesia providers serving in upcoming wars. In short, it was felt to be ethically indefensible not to collect, organize, and record the advances in anesthetic practice that military anesthesia providers have achieved in the last 13 years of conflict. It was determined that the text would be a collaborative effort between military anesthesia providers of both the United States and United Kingdom, leveraging the experiences of the countries that provided the largest military medical response to the recent conflicts. The majority of chapters are products of this collaboration and naturally contain different perspectives of the two countries.

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. In the conflicts in Afghanistan and Iraq, coalition medical forces achieved a died-of-wounds rate below 10%. This statistic is historic and unprecedented in armed conflict. Many factors have contributed to this achievement, including improvements in body armor, highly trained medics, greater availability of blood and blood products, improved medical imaging far forward, faster evacuation with improved en-route care, and enhanced surgical approaches to wounds and trauma. Advances in battlefield anesthesia have made modern battlefield trauma resuscitation and surgery possible and thus have contributed greatly to enhanced survival of the injured.

The goal of this book is to document recent lessons learned in the anesthetic care of combat casualties and serve as a training foundation for anesthesia providers tasked with or contemplating providing anesthetic and analgesic care in future conflicts and disasters. The majority of its authors have deployed in the recent conflicts and are recognized authorities in the areas their chapters cover. This text is a tribute to their efforts and the patients they cared for and a gift to the next generation of combat anesthesia providers. We also take the opportunity to thank Mr Raul Gordon, of the Henry Jackson Foundation and Defense & Veteran Center for Integrative Pain Management, and Ms Alison Bess, of the Royal Centre of Defence Medicine. They have chased down authors, kept editors honest, and organized complex contributions. Without them there would be no book.

It was no easy task editorially; truly the United States and United Kingdom are two historical allies separated by a common language.

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