

Alberta Doctors' Digest

Extreme Medicine

Extreme Medicine: How Exploration Transformed Medicine in the Twentieth Century (Dr. Kevin Fong, Penguin Press, 2014)

Dr. Anna Bagenholm, a 29-year-old Norwegian physician, was skiing with two colleagues when she lost control and slid into a frigid mountain stream. Her friends tried to pull her out, but were unable to do so and she remained immersed in the cold water. When help arrived 80 minutes later, Anna was pulled from the water pulseless and cold. Clinically dead, she was transferred to Tromsø University Hospital with a core body temperature of 13.72°C (56.7°F). She was aggressively resuscitated, including cardiopulmonary bypass to oxygenate and warm her blood. After a three-hour hiatus, her heart began to beat again.

Anna's recovery was miraculous. She woke 12 days after her accident, initially paralyzed, but she recovered from this over subsequent months. Some years later, she was able to complete her medical training and was even able to ski again. Her recovery has led to increased understanding of hypothermia and its possible protective effects on the heart, brain and other organs.

Author Dr. Kevin Fong has argued in his recent bestseller that medical risk taking, such as was required with Anna, has often been necessary in efforts to help patients in the face of massive injuries or exposures that ordinarily prove fatal.

Each chapter of Fong's book *Extreme Medicine* considers a different challenge to survival. The chapters titled, *Ice*, *Fire*, *Water*, and *Orbit* focus on efforts to keep people alive after exposure to extreme circumstances; the ones titled, *Heart*, *Trauma*, and *Intensive Care* examine clinical breakthroughs after major injury, infection or organ damage.

Fong's book is a compilation of clinical successes in risky endeavors.

Burn treatment

Archie McIndoe and Harold Gillies' efforts to reconstruct the bodies and faces of pilots and other personnel during World War II revolutionized burn treatment and reconstruction. McIndoe developed the walking-stalk skin graft and promoted saline immersion for extensive burns. His cousin, Harold Gillies, had earlier pioneered facial plastic surgery techniques during World War I. Both emphasized the importance of rehabilitation.

Manual ventilation

Anesthetist Dr. Bjorn Ibsen, known as the founder of intensive care medicine, found himself in the midst of a polio epidemic in 1952 in Copenhagen, Denmark. Ibsen

invented positive pressure ventilation by means of intubation into the trachea, replacing the iron lung with technology still used today for patients who are unable to breathe on their own. His 12-year-old polio victim was suffocating when Ibsen was brave enough to sedate her so that manual ventilation could restore cardiorespiratory stability.

Open heart surgery

The heart was long considered a surgical no-man's-land. In 1917, British surgeon Dr. Grey Turner tried to remove a bullet lodged in a soldier's beating left ventricle. Turner opened the heart in several places, but when he turned the heart over to obtain exposure, the heart stopped. Replaced in its normal position, the heart began to beat again. Turner abandoned his attempt to remove the bullet, but the soldier recovered nonetheless.

Turner's experience was successful enough to prompt Dr. Dwight Harken, an American surgeon working in England, to go further. Harken was subsequently able to remove 134 missiles from the hearts of soldiers wounded during World War II. Harken and others forged on after the war. Assisted by antibiotics, transfusion medicine, trained teams, and protocols, they attempted to repair mitral valves damaged by rheumatic fever. Initial mortality was very high – six of the first nine patients died. But Harken and competitor Dr. Charles Bailey in Philadelphia persisted in the face of criticism and were eventually successful. As Fong says, "The continent of the heart was finally open for exploration."

Trauma care

In his chapter *Trauma*, Fong reminds us that care of the wounded has a somewhat longer history. Dr. Domenic-Jean Larry, chief surgeon to Napoleon in the late 1700s, initiated early care of the wounded with horse-drawn carriages travelling with the front-line troops.

Larry's "flying ambulances" were able to save men whose wounds would otherwise have been fatal, prompting the first helicopter evacuations in World War II. Transport to mobile army surgical hospitals (MASH) became routine in the Korean War. The importance of early care has been re-emphasized in the last several decades, with the concept of the "golden hour" and the injunction that no more than 60 minutes should elapse post-injury before definitive care.

In discussing the evolution of intensive care, Fong notes that the ability of anesthetists and others to support and replace the function of organ systems has been vital to the development of the specialty. The modern intensive care unit can be regarded as an extraordinary effort to stretch human physiology beyond earlier limits.

Informed by experience

Fong is not only a medical historian; he's a British anesthetist who has treated patients in ERs, ICUs, helicopters, and even on the streets of London after a bomb explosion in Soho. The son of Chinese parents who immigrated to Mauritius, Fong studied astrophysics before his medical studies and, obsessed with spaceflight, he enrolled in aerospace studies at NASA's Johnson Space Center in Houston, much-interested in the body's response to spaceflight. He's an associate director of the Centre for Altitude,

Space, and Extreme Environment Medicine in London and has experience on the “Vomit Comet,” an Airbus designed to simulate weightlessness in space.

Fong describes the challenges inherent in our altered physiologic responses to space. Astronauts lose cardiac and skeletal muscle conditioning in space as well as bone mass. Once back on ground, they face further issues with faintness, sleep disturbance, nausea and vomiting, and transient disorientation.

Not only an author but an adventurer, Fong is familiar, first-hand, with the physiologic problems associated with scuba diving. Reef diving near Fiji, and swept away from fellow divers, he panicked and used up his oxygen supply surfacing to find his fellow divers. He spent an anxious night thereafter, worried about the possibility of decompression sickness.

As an author, Fong combines personal anecdotes regarding medical history in clear writing that emphasizes what we have learned about human physiology in diverse, extreme circumstances. He finds this journey comparable to our exploration of the planet in past centuries, which were remarkably risky endeavors, though we celebrate the discoveries rather than the legacy of loss. As prime example, Fong recalls the saga of Ferdinand Magellan, who set sail from Spain in 1519 with a fleet of five ships and a crew of 237. Magellan’s expedition met famine, disease, mutiny and conflict. Magellan himself perished, murdered in the Philippines. Only one of the five ships that started the journey made it home in 1522, three years post-departure, with a scant 18 of the original crew.

Fong concludes that it is human nature to explore bravely, without fear of consequences. “To be able to explore, we must continue to survive. But the reverse is also true. To survive, we must explore.” This may overstate things, but it is a compelling proposition. I’m mindful of T.S. Eliot’s lines, equally true, regarding the mystery of discovery:

“We shall not cease from exploration

And the end of all our exploring

Will be to arrive where we started

And know the place for the first time.” (*Little Gidding*; 1942)

I recommend this book by Dr. Fong. It was a romp and an adventure – but one without the risk.

Enjoy.

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