

Anesthesia Aboard the Hospital Ship *Mercy*

Care in the Wake of the Indonesian Tsunami

By J. William Sparks, M.D.

Following the catastrophic results of September 11, 2001, the Southeast Asian tsunami 2004, as well as hurricanes Katrina and Rita 2005, medical professionals have heightened their preparedness and responsiveness to natural disasters. As a result of these cataclysmic events, political and medical community leaders have moved disaster medicine and disaster management to the forefront of government and community attention.

As a Navy anesthesiologist, my introduction to the field of disaster medicine came in the wake of the December 26, 2004 tsunami that afflicted much of Southeast Asia. The USNS *Mercy* (www.mercy.navy.mil) is one of two Navy hospital ships uniquely qualified to provide tertiary medical and surgical care anywhere in the world. The primary role of the *floating hospital at sea* is trauma management and medical transport of military troops. As a secondary function, the ship is designed to provide medical and surgical capabilities to assist in the relief of natural or man-made domestic and international disasters. In spite of this capability, the *Mercy* was rarely used in a humanitarian capacity since it was commissioned. Responding to the disaster and humanitarian crisis that occurred following the tsunami, the United States' military deployed the *Mercy* as part of Operation Unified Assistance.

The tsunami brought about devastating destruction of medical infrastructure within the Aceh province of Indonesia. The vast majority of military, psychiatric, private, and provincial health facilities were decimated. Within the hospitals, all patients died during the initial flooding as a result of severe trauma or injuries or from a lack of immediate care facilities. Moreover, in excess of 75 percent of the health service staff in the area were killed or displaced. In the wake of destruction, only the immediate and superlative international response prevented the decimation of the entire Northern Sumatra population. Following the waves of destruction, the rapid establishment of medical infrastructure, clean water, and food supplies quickly controlled potentially catastrophic disease outbreaks.

My involvement in the relief mission was unexpected. On January 2, 2005, I was informed that I would act as the sole Navy anesthesiologist originally deployed for this historic mission. I had 72 hours to get my sea bag and supplies on board the ship and take control of the Anesthesia Department.

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After practicing in a large, modern medical facility, I took for granted the administrative and logistic details of setting up anesthesia machines, ensuring an adequate gas supply, organizing and stocking medication carts, preparing and supplying preoperative and postoperative assessment areas, procuring and accounting for controlled substances as well as standard anesthesia medications, and transporting patients safely from one area of a hospital to another. This was the first time I and others had to ensure we had the necessary equipment and materials to safely run a modern operating room and treatment facility. It took time, attention, and energy to get the operating rooms and anesthesia equipment to an acceptable level under the umbrella of *standard of care*.

When up and running, the surgical capabilities of the *Mercy* are impressive. The main operating room area contains 11 large operating rooms and an interventional radiology suite. There are four different intensive care units that are able to care for critically ill patients and six different medical-surgical wards that can care for hundreds of less injured or ill patients. The core medical team that deployed for this mission was asked to provide the resources necessary to run up to four operating rooms, and one functional ICU/PACU area, and provide care for 50 to 100 medical/surgical inpatients. None of these areas was mission-ready when we deployed from San Diego. Each treatment area needed to be completely refurbished, reassembled, and restored with modernized equipment. Several tons of outdated, broken-down equipment and materials had to be removed.

The integration of civilian medical professionals aboard a military vessel for a medical mission caused apprehension because it was never done before on this scale. The first wave of civilian medical professionals from the non-government organization Project HOPE boarded the ship while in Singapore in late January 2005. The addition of over 200 civilian colleagues brought a sense of purpose and positive energy that was in great need. Weeks of cleaning, reorganizing, and adjusting to new living and working environments had tempered our initial excitement. With the arrival of the civilians, we all desired to channel our energy to doing the most good for the most people. To their credit, the civilian medical teams seamlessly integrated into the *Mercy* medical treatment facility. They quickly assisted with final preparations for the medical/surgical wards as well as the ICU/PACU areas. The anesthesia team consisted of three anesthesiologists—one Navy and two civilian—and a Navy CRNA for the first half of the tsunami relief mission, three anesthesiologists and two CRNAs—all providers were civilian except for me—in the second half of the relief mission.

Our arrival at the site of destruction was met with reservations by many international care groups as well as foreign military medical teams who doubted the need for the *hospital ship from America*. Much of the initial immediate care

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needs were addressed with the outpouring of international medical and community support. We spent two days off the coast of Banda Aceh before receiving permission from the Indonesian government to care for patients in the area. Our very first case proved our capability and overall net worth for the relief mission. Ten-year-old Wahyu had lost both parents and a sister in the tsunami. He was cared for by his uncle, who had lost his wife and son as well. Wahyu developed an aggressive case of appendicitis in the morning of February 6th. His uncle took him to all the local facilities as well as the German military medical center. They were denied care due to a lack of operating room availability. His uncle was directed to the beach where the *Mercy* had established a care facility in order to provide medical treatment as well as triage potential patients for the MTF. It was late afternoon when Wahyu arrived at the beach point of care facility and onshore personnel were preparing to return to the ship. After spotting Wahyu in his uncle's arms, a Project HOPE nurse quickly notified others before beginning an examination. Wahyu was in obvious need of care, displaying classic signs of a surgical abdomen as well being febrile and hypotensive. An intravenous line was started and Wahyu began to receive resuscitative fluid. Soon, Wahyu and his uncle were evacuated by helicopter to the *Mercy*. Onboard, we learned about the case and prepared the operating room for an exploratory surgery. I discovered that a 10-year-old Indonesian boy is about the size of a five or six-year-old American boy. The smallest endotracheal tube I had was a 6.0 cuffed endotracheal tube. I performed a rapid sequence induction and was fortunate that the endotracheal tube fit into his trachea. Wahyu had perforated appendicitis and was septic. He would have likely died had he not received surgical therapy. He spent two days in the ICU and another five days aboard recovering before leaving us. He became the unofficial mascot of the mission and in a sense helped us gain access and acceptance to the ongoing medical relief mission.

Of the 275 surgical procedures completed during the tsunami relief efforts, only 8 percent of the cases were directly related to injuries sustained during the actual disaster that occurred six weeks prior to our arrival. Those people who received essential medical care, through humanitarian measures, had survived the primary assault but were either still wounded from their initial injuries or had medical conditions that preceded the tsunami. We cared for a number of orthopedic cases involving fractures not treated for more than six weeks. A burn surgeon treated many scar contractures resulting from burn injuries in both adult and pediatric patients. Also, we performed palliative surgeries on patients with many different forms of cancer. Finally, we performed routine general surgery cases involving hernia repairs, appendectomies, as well as some pediatric cases involving corrections of imperforate anus, cleft lip and palate corrections, removal of tumors and nonfunctioning

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kidneys, and even performed a splenectomy on two children with pathologic splenomegaly.

Many challenges developed during the three months that the *Mercy* assisted in the relief effort. During an international relief mission, the ability to communicate and garnish medical history became extremely arduous at times. Though they worked hard, the few available interpreters were not medically savvy and frequently had difficulty translating medical information. Further, communications between land-based medical teams and the *Mercy* were inconsistent and at times erroneous. Cultural differences with respect to obtaining consent and agreeing with medical management delayed patient transport and surgical procedures because resolution often meant talking to second or third parties. Ethical considerations about the right course of action or treatment regularly came into play. Halfway through the mission, the transition of civilian medical teams rapidly changed our surgical and medical capability. Finally, the actual discharge of patients from the *Mercy*, including timing as well as the provision of necessary supplies and medications, was a continuous source of concern.

Specific anesthesia challenges related to appropriate supply and equipment procurement. The *Mercy* was configured to care mostly for adult patients. Humanitarian Assistance and Disaster Relief missions involve treating infants and children along with adults. As a result, we struggled to get appropriately-sized pediatric equipment and monitoring capability for intra-operative and intensive care use. A lack of medical air limited our flexibility of fresh gas flow during operative cases. The ship had no cell salvage capability due to incompatible materials with our cell salvage machine. Additional equipment deficiencies limited our ability to utilize advanced airway equipment for known and unanticipated difficult airway management.

The United States sent the hospital ship *Mercy* overseas to provide tertiary support for local care supplied by charitable organizations as well as military medical components from Germany, Australia, Singapore and Japan. During our mission, military and civilian health professionals combined resources and talents to provide care for the patients affected in the Aceh Province in Northern Sumatra, Indonesia. To my knowledge, the *Mercy* broke ground in proving the success of a collaborative effort aboard a military vessel. This extraordinarily valuable “team of teams” concept revolutionized the way military medicine aligns itself with civilian organizations to provide medical care for domestic and international Humanitarian Assistance and Disaster Relief missions. I also believe the *Mercy* effort set the foundation for future federal medical responses to areas afflicted with natural disasters that are

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overwhelmed by the injured or incapacitated who have nowhere else to turn for lifesaving treatment.

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By the Numbers // Critical Condition

26 Percentage increase in U.S. emergency room (ER) visits during the 1993–2003 period, compared to a 12.5 percent increase in the U.S. population during that time

15 Percentage decrease in the number of U.S. ERs during that period (from 4,791 to 4,073)

1,440 Average number of ambulances each day turned away from an ER at maximum capacity

65 Short-term survival rate as a percentage, following cardiopulmonary resuscitation on the TV show *ER* during the 1994–95 season; the actual rate is anywhere from 7 percent to 15 percent

3.2 Average time, in hours, a patient spends in the ER, 46.5 minutes of which are spent waiting

1.9 Millions of times ER patients left without being treated in 2003—1.7 percent of all ER visits

14.1 Percentage of total visits to ERs, in 2003, made by uninsured persons

5 Percentage of funding that emergency medical services received from the Bioterrorism Hospital Preparedness Program in 2002; the funding, which typically ranged from \$5,000 to \$10,000 per hospital, is not enough to fully equip one intensive care room

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