What is it like to practice nursing in a large hospital at sea? During the summers of 2009 to 2012, the authors (a civilian critical care nurse and a US Navy critical care nurse) had the opportunity to serve onboard the USNS Comfort (T-AH 20) and USNS Mercy (T-AH 19) as part of an international coalition of military and civilian clinicians led by the US Navy. The scheduled humanitarian civic assistance (HCA) missions, as peaceful partnerships within the Asia-Pacific, Caribbean, and South American regions, provided health care to developing nations. This article introduces readers to a brief history of the ships, frontline nursing practice and teamwork, and life at sea, including perspectives and experiences that challenged and strengthened critical care practice.
Background

Comfort and Mercy have “up to 1000 beds within the medical treatment facility . . . spaces [that] can be tailored to meet expected patient throughput and variable lengths of stay based on the intensity of required care” (Figure 1). “The primary mission of these ships is to provide afloat medical capability for acute medical and surgical care for forward deployed operational forces of the military services. However as a secondary mission, the ships provide a full-service hospital asset in support of disaster relief, humanitarian assistance, and defense support to civil authorities . . . worldwide.”1 The hospital ships may be redirected at any time for the primary mission, if underway during secondary missions. They are 2 of the largest trauma facilities in the United States. Civilian service mariners working for the Military Sealift Command are responsible for the safe operation, navigation, and maintenance of the ships, whereas the Navy command is responsible for the hospital and its staff.2

The ships’ past missions include many assignments that demonstrate what valuable resources they are at home and abroad. For example, Comfort offered service during Operation Desert Shield and Desert Storm and Operation Noble Eagle (after the attack on the World Trade Center Towers, September 11, 2001).2 Mercy participated in Operation Desert Shield and Unified Response where rescue efforts were focused in Indonesia after the devastating tsunami in 2004.3

Provencher and Douglas4 relate that after providing exceptional support during the tsunami in 2004, the utilization of Mercy and Comfort was reassessed. The military realized that these ships are a powerful resource and decided to use them on a more frequent, planned basis. Successful HCA missions throughout Southeast Asia were conducted by Mercy in 2006, 2008, 2010, and 2012. Comfort successfully deployed to the Caribbean and to Central and South America on alternate years (2007, 2009, and 2011). After Comfort’s mission in 2011, Navy Captain Brian Nickerson, Continuing Promise (CP) mission commander,

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stated, “This region is inextricably linked to the economic, political, cultural, and security fabric of the United States. This deployment also enables us to engage with regional partners and improve interoperability, relationships [that] could be called upon in the event of a regional crisis.”

The ships have 12 operating suites; however, only up to 8 of them were used during CP 2009, CP 2011, and Pacific Partnership (PP) 2010 and 2012 because of issues with staffing, supplies, and anesthesia support. Hartgerink et al. report the use of only 4 operating rooms during Comfort’s HCA mission in 2007. The variety of physicians and dentists on board offered services such as general surgery (adult and pediatric), orthopedic surgery, urology, ophthalmology, gynecology, plastic surgery, otolaryngology surgery, and oral maxillofacial surgery. Nonsurgical medical capabilities included internal medicine, dermatology, cardiology, dialysis, psychiatry, respiratory therapy, physical therapy, and angiography. For clinical purposes, the ships are capable of diagnostic radiography, ultrasound, computed tomography, and interventional radiology. Supporting these services are laboratory, pathology, sterilization, and biomedical repair facilities. The ships also contain decontamination areas at entry points, a pharmacy, 2 oxygen-producing plants, a blood bank, and a sick bay clinic for the crew. The ships have 80 intensive care unit (ICU) beds, 20 postanesthesia care unit (PACU) beds, 400 intermediate care beds, and 500 minimal care beds. The casualty-receiving, or emergency department, holds 50 beds, including a 4-bed isolation room. Another isolation room with capacity for many other beds is located within 1 of the 4 ICUs, where negative pressure ventilation is available for patients with contagious airborne diseases. Adult patients were assigned to specific bed areas depending on their intended surgery. In general, children were assigned to the pediatric care area. The ships also provide a helicopter-landing deck capable of landing most helicopters, including the SH-60 Sea Hawk helicopter, which can facilitate transportation for staff, patients, and supplies.

Clinicians may spend a few weeks to several months on Comfort or Mercy, depending on organizational needs and the assignment. Personnel numbers varied throughout the mission, with a continuous fluctuation of reservists, volunteers, and partner-nation military members. These resources augmented the core military personnel who remained onboard during the entire mission. Nongovernmental organizations (NGOs) such as the LDS Charities and Project HOPE were granted approval by the US Navy to select clinical volunteers for specific services (orthopedic physician, ICU nurse, translators, etc). Each NGO had specific inclusion and exclusion criteria, guidelines, selection processes, and compensation for their volunteers. Also onboard were medical providers from the Air Force, Army, US Public Health Service, and Coast Guard. The diversity of the medical and nonmedical crew onboard Comfort and Mercy brought together a strong coalition to complete the mission (see Table).

### Frontline Nursing Practice and Teamwork

As with any nursing position, the hospital ships warranted flexibility, varied job descriptions, and opportunities to volunteer in several different venues. As with any nursing position, the hospital ships warranted flexibility, varied job descriptions, and opportunities to volunteer in several different venues.

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### Table: Impact of these missions: statistics from the cruise book of Continuing Promise 2011

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>People assessed via triage (medical/surgical)</td>
<td>67,879</td>
</tr>
<tr>
<td>Medical patients seen at Medical Civil Affairs Program sites</td>
<td>37,766</td>
</tr>
<tr>
<td>Surgeries</td>
<td>1108</td>
</tr>
<tr>
<td>Dental patients seen</td>
<td>9,524</td>
</tr>
<tr>
<td>Optometry patients seen</td>
<td>18,513</td>
</tr>
<tr>
<td>Pharmacy patients seen</td>
<td>97,162</td>
</tr>
<tr>
<td>Animals treated</td>
<td>8,202</td>
</tr>
<tr>
<td>Tours given</td>
<td>3,270</td>
</tr>
<tr>
<td>Helicopter hours flown (2 onboard)</td>
<td>450</td>
</tr>
<tr>
<td>Subject matter expert exchanges, host nation participants</td>
<td>1,207</td>
</tr>
<tr>
<td>Engineering projects</td>
<td>14</td>
</tr>
<tr>
<td>Nongovernment organization projects (eg, donating backpacks with school supplies)</td>
<td>87, reaching 71,108 people</td>
</tr>
</tbody>
</table>

*Continuing Promise 2011 Cruise Book, page 179, created by the CP11 Cruise Book Committee and published January 2012.*
to volunteer in several different venues. All registered nurses were required to bring a copy of their license, highest diploma granted, Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) certifications, and any disaster certifications. US Navy military officers were responsible for staffing and patient flow in their clinical area. Registered nurses were assigned according to needs in casualty receiving, pediatrics, medical/surgical, the operating room, PACU, ICU, Medical Civil Affairs Program (MEDCAP) and Surgical Civil Affairs Program (SURGCAP) sites, and discharge planning. Shifts lasted either 8 or 12 hours. Registered nurses were expected to lead as charge nurses supervising other registered nurses, licensed practical nurses, and hospital corpsmen (enlisted US Navy clinical support/medical assistants, many of whom are highly trained); provide competent nursing care for a variety of typical and atypical patients; be clinical resources; motivate unit staff; share any professional concerns and cross-train in other inpatient specialty areas if interested.

Departments that went ashore requested nurses to provide education and training support, act as triage and provider assistants at the MEDCAP sites, and contribute during engineering or veterinarian projects. The MEDCAP sites were clinical sites ashore, set up in a variety of locations (schools, clinics, auditoriums, etc) to reach populations needing medical care. They provided medical (family practice, pediatrics, women’s health), dental, and optometry services.

Our job as clinicians was to assist the country, working together to meet the needs of their population, not to create a larger burden on their medical system after we left.

Having experience or a certification in a particular nursing specialty did not guarantee placement in that field onboard either ship. Some critical care nurses were assigned to work in the PACU, whereas others assisted as educators/liaisons assigned to discharge planning. The HCA missions are structured to complete minor surgeries and to treat injuries and illnesses, while avoiding the need to place true critical care patients back into the medical system within the country.

Although each ship had a potential for 80 ICU beds, fewer than 20 ICU beds were used on either ship during the HCA missions. As Hartgerink et al’ stated about their experience,

The relatively short mission duration in each country made it impossible or unwise to engage in larger, more complex surgical cases [that] would require extended postoperative inpatient care and prearranged surgical follow-up in host nation medical facilities.

The mean length of stay for host-nation patients was 2 days. Some of the more common surgeries undergone by patients admitted to the ICU were hysterectomies, thyroidectomies, cleft lip/palate repairs, and orthopedic cases. Many of the postoperative adult and child ICU admissions were precautionary to address pain control, monitor airways and hemodynamics, evaluate decreased mobility, or improve the nurse to patient ratio. To introduce staff to the critical care environment onboard, seasoned critical care nurses were integrated with corpsmen and with less experienced critical care nurses from the US military, foreign military, and NGOs. Numerous training opportunities were seized at the bedside or during formal and informal educational discussions among all clinicians.

Nurses and other providers continued to care for patients while these floating hospitals sailed between countries. Any personnel onboard or any US military troops nearby in need of hospitalization were admitted onboard to be observed in the ICU, regardless of the nature or severity of their illness. For instance, a US Navy submariner in the region started to experience chest pain and was transferred to Comfort for laboratory testing, a cardiology assessment, and medical treatment. Another sailor was transported to Comfort by helicopter to have his appendix removed. Also, any victims of mishaps or those in need of overnight observations were admitted to the ICU. During CP 2011, while Comfort was anchored off the coast of Colombia, 4 victims of an improvised explosive device blast were brought onboard per their country’s request for assistance. Three were released with minor injuries; however, 1 of the injured was a true critical care patient who underwent surgery and medical treatment. He was transported by helicopter to a trauma center in Colombia.

Caregivers and other staff had to endure the threat of dangerous weather while onboard. During CP 2011, Comfort was anchored 3 miles (4.8 km) from Haiti. As
hurricane Irene approached, *Comfort* discharged all patients to shore and sailed to calmer Caribbean waters. While away from shore, preparations were made to deal with possible hurricane aftermath injuries in Haiti. Fortunately, the hurricane’s category was downgraded and *Comfort* returned to Haiti to resume previously planned surgeries. Because of heavy rains and ensuing mud from the hurricane, 1 onshore MEDCAP site was no longer usable. Consequently only 1 onshore clinic was available for outpatients. The crew quickly adapted to rearranged schedules to fulfill the mission at hand. As the hurricane tracked along the east coast of the United States, there was a short period when *Comfort* was on standby to assist as needed back at the US Eastern Seaboard.

The language barrier and access to patients’ data proved to be a challenge at times. Civilian nurses rarely had access to patients’ electronic data such as results of laboratory tests and radiologic images. Therefore they often relied upon their assessment of the patient, physicians’ orders, and colleagues to establish nursing care plans. Most patient care was documented via paper charting. Upon discharge, all patients were given discharge instructions in their language along with a hardcopy of their chart. A linguist department was onboard and consisted of a small core group of military staff and NGOs fluent in specific languages. Native translators were also coordinated through the country’s Ministry of Health and the US embassy to assist with translation on or off the ships. If medical providers were proficient in host nation languages, they were highly sought after to assist the linguist department with interpretation services during tours of the ship for host nations’ officials and media, as well as providing care for patients, including discharge instruction.

As previously mentioned, opportunities for nurses to go ashore consisted of assisting at MEDCAP sites and at subject-matter expert exchanges. Transportation to shore was by either helicopter or small boat. Once onshore, motor vehicles shuttled the military and NGO workers to their working destinations. At the MEDCAP sites, host nation translators assisted clinicians by directing potential patients to designated screening areas. They also helped patients complete the required information forms. Once triage was completed, the patients were seen by physicians, nurse practitioners, dentists, optometrists, or physician assistants and treated medically. Surgical specialists assessed other patients 1 to 2 days onshore immediately upon our arrival. Qualifying patients were scheduled for surgery and given a date, time, and place to be transported to the ship via small boat or helicopter.

**Education**

Education was paramount to the success of the ships’ service. During subject-matter expert exchanges, nurses volunteered to assist the onboard education department in teaching medical topics that were requested by each country. The subject-matter expert exchanges were conducted onboard as well as onshore. During PP 2010, Southeast Asian nurses were invited onboard *Mercy* to learn ACLS skills. The course was taught by 2 internal medicine physicians (1 military and 1 from an NGO) and 2 ICU nurses (1 military and 1 from an NGO) through a host-nation translator. Instructional methods included discussions with demonstrations and PowerPoint lectures followed by breakout sessions for skills practice. Handouts reviewing ACLS drugs were also given. Differences in global practice were evident and host nation professionals were excited to learn. Southeast Asian nurses marveled when taught that as a code blue is called in US hospitals, clinicians rush to help and that codes may extend longer than 20 minutes. Their practice included terminating a code after 1 minute. They were also not accustomed to practicing on mannequins. Several simulated case study practice scenarios proved to be most beneficial to them. A few of the crew had opportunities to go ashore and tour government-based regional hospitals. Developing nation governments now encourage health care education and hospitalized care among vulnerable populations rather than local alternative care practices.

Most ICU patients seemed to accept and readily comply with the simple practice of hand hygiene before meals and after using the bathroom but other activities of daily living were not so easily adopted. Basic daily oral hygiene and wound care required repeated nursing instructions, demonstrations, and monitored practice before patients could perform them independently. Adding to the difficulty, patients reported the lack of running water, electricity, and adequate nutrition for healing in their homes.
Ship Life

Living and working at sea had several challenges. One rule of thumb was to pack only essential personal items and clothing and to be able to carry your own bags. Personnel used the stairs or ramps to navigate elevations throughout the ship. The ships’ elevators were for cargo or postoperative patient use only. Personnel were instructed to carry a cover (hat), wear long sleeves, and respond to all drills and emergencies. Wearing jewelry was strongly discouraged for safety reasons aboard ship and onshore because it could call attention to the wearer in large onshore populations.

Berthing (sleeping area) was divided into male and female decks (floors) and officer and enlisted personnel areas. Officer berthing consisted of 2-tiered bunk beds with 6 to 8 beds per room (Figure 2). Berthing for enlisted personnel consisted of 3-tiered bunk beds with more than 100 beds per room. NGO workers were assigned to both berthing areas or in the overflow patient care areas (2-tiered racks) along with host-nation translators. Throughout the day, overhead announcements alerted the crew to wake up, leave to go ashore, meal-times, clean the ship, evening prayer, and silence for nighttime sleep.

Both Comfort and Mercy were subjected to seaport water levels, tides, currents, and changing weather conditions. Tides, currents, and storms influenced the roll of the ship. Equipment such as beds, intravenous poles, and supply drawers were locked and tied down for safety. Equipment that was not secure was subject to rolling and crashing into fixed objects or walls (Figure 3). Starting intravenous catheters while the ship was swaying from side to side was challenging. Surgery could be cancelled if the ship’s motion interfered with intraoperative precision. If seasickness or any other health concern developed, crew members were encouraged to report to sick bay for evaluation and treatment.

In general, little time was available for leisure activities. The military members fulfilled their duties during the day and participated in meetings, naval classes for rank advancement, or Surface Warfare Qualification classes at night. Even while sailing, unit personnel staffed their areas should needs for clinical service arise. Some NGOs held a nightly meeting to share news of upcoming
events and provide inspirational thoughts. A beautiful sunset or star gazing on a clear night often lifted spirits for all sailors so far away from home.

Conclusion
Serving on the ships was challenging and demanded constant professionalism. It required the crew to dedicate themselves to improving the lives of patients as well as supporting other shipmates. The critical care nurses demonstrated expertise while caring for patients from diverse backgrounds. Sensitivity to cultural differences was heightened and clinical knowledge was shared through their leadership to facilitate positive outcomes. The undertakings of *Comfort* and *Mercy* were successfully completed. The critical care nurses who served aboard *Comfort* and *Mercy* are grateful for their experiences and encourage readers to consider additional practice opportunities such as volunteering for humanitarian nursing at sea!

**CCN**

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Tales From the Sea: Critical Care Nurses Serving Aboard the USNS Comfort and USNS Mercy

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