Experiences of the Pharmacy Service, 31st Combat Support Hospital During Operation Desert Storm

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The mobilization and performance of the Pharmacy Service of the 31st Combat Support Hospital (CSH) during Operation Desert Shield/Storm in Southwest Asia. This deployment which involved active duty and reserve pharmacists and technicians from Germany and the United States, respectively, took place from November 1990 to January 1991. The unit equipment and supplies for the pharmacy were shipped from Germany and the United States from December 1990 to February 1991. Implementation of an outpatient pharmacy clinic, standardization of the antibiotic prescribing by the medical staff, and conducting of a sterile products preparation training program were just some of the tasks performed by the pharmacists prior to the influx of casualties. Wounded in action and disease non-battle casualties were supported by 24-hour pharmacy coverage. The pharmacy utilized a Zenith 248 computer to generate intravenous solution labels and to track patient orders. The majority of intravenous solution orders were for cefazolin 1 gram. Of the 211 patients hospitalized, the most frequently treated wounds were shrapnel/gun shot (37.9%) and orthopedic injuries (37.0%).

On Aug 2, 1990, the Republic of Iraq invaded the Emirate of Kuwait. President Bush ordered troops from the United States to deploy to the Kingdom of Saudi Arabia on Aug 6, 1990 to prevent an invasion of that country. On Nov 8, 1990, the President ordered additional troops to the region to insure security and to provide a sufficient force to expel the Iraqi Army if economic sanctions did not work. This paper describes the experiences of the Pharmacy Service of the 31st Combat Support Hospital (CSH) as they deployed from Stuttgart, Germany to support the second echelon movement into the Persian Gulf Region for what would become known to the world as Operation Desert Storm.

Before Nov 14, 1990, the 31st CSH was a 200-bed field hospital equipped with Mobile Unit Self Transportable (MUST) equipment from the 1970s. With an assigned strength of only 95 of the required strength of 302 personnel, there were two junior enlisted pharmacy technicians and no pharmacy officers. Over a period of five weeks, the 31st CSH exchanged its MUST equipment for a late 1980s-era Deployable Medical Systems (DEPMEDS) hospital. The unit trained with the DEPMEDS equipment for a period of less than one week, inventoried, packed and shipped the hospital to Saudi Arabia via Antwerp, Belgium. The unit also expanded to a strength of 292 personnel, which included three pharmacy officers and four junior pharmacy technicians.

The main body, consisting of the enlisted members of the unit, the administrative staff, and key clinical officers (to include the chief pharmacist, flew to Saudi Arabia on Dec 26, 1990. The remaining pharmacists, physicians and nurses joined the unit in the Eastern Saudi Arabian desert on Jan 14 — about the same time that the equipment arrived and just prior to the outbreak of the air war. Even when the equipment arrived, it remained uploaded and ready for movement. The hospital personnel trained on common soldier and advanced trauma life support skills while awaiting orders to move from a tactical assembly area (TAA) to the forward assembly area (FAA) — the location where we set up the hospital. In late January, the 31st Combat Support Hospital (CSH) expanded to a 400-bed facility when it merged with the personnel from the 115th Mobile Army Surgical Hospital (MASH) and the equipment from the 345th CSH. The explanation for this merger is beyond the scope of this paper. The pharmacy staff now included five pharmacy officers, three senior and four junior pharmacy technicians. The merger initiated changes to the already developed drug distribution scheme. Additionally, due to overall hospital management concerns, the chief pharmacist devoted over 75% of his time to the operations area of the hospital administration leaving most of the daily operational direction to the assistant chief.

During the period of waiting in the TAA, the pharmacy staff aggressively pursued building an inventory to treat an expected casualty rate of 600 patients per day. In addition to an initial supply order to the Medical Supply and Optical Maintenance (MEDSOM) battalion in excess of $150,000, the pharmacy staff designed a template to allow for automatic "push packages" of trauma medicine and supplies for delivery on an as needed basis. The pharmacy staff took actions to compensate for design shortfalls with the DEPMEDS equipment fielding. The DEPMEDS equipment set limited the pharmacy to a "2 to 1" expandable shelter (259 square feet of floor space). An exchange was made with the medical maintenance section to give the pharmacy a "3 to 1" shelter (398 square feet of floor space). A commercial 20 foot sea-land type van was used to provide an additional 142 square feet of storage space.

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Also in the TAA, the pharmacy staff assumed responibility for establishment and administration of an ambulatory patient care clinic to serve the soldiers (approximately 10,000) located within the area. The pharmacy staff worked with the Department of Medicine to develop a standardized antibiotic prescribing scheme based on body system involvement (eg, all open gut wounds would be treated with gentamicin, metronidazole and ampicillin). Additionally, due to a lack of sterile product preparation experience, an aggressive training program was conducted for pharmacy technicians.

The gathering of all units in tactical assembly areas more than 100 miles east of the final staging areas was part of the master deception plan to deceive the Iraqi's into believing that the US-led coalition forces were planning a frontal assault on the Kuwait border rather than the bold flanking movement conducted across Southern Iraq into Western Kuwait. The orders to move to the forward deployed area came in mid-February. The hospital moved into an area approximately 23 miles south of the Iraqi border (just out of Iraqi artillery range) in support of the 1st Infantry Division and 1st British Armored Division. Their operation was to create a breach in the Iraqi defenses, while the 1st and 3rd Armored Divisions made the "end run" around the flank. It was expected that the greatest number of casualties would occur during the breaching operation.

A week prior to the breaching operation, on Feb 17, 1991, the hospital received its first patient—a casualty from probing actions prior to the ground war. From then until March 3, 1991, the hospital treated over 211 inpatient casualties of which 181 were addmitted after Feb 24 (the beginning of the ground war). The census for that time period was: US service members–101; British–10; and enemy prisoners of war (EPW)–100. The antibiotics used for these patients are listed in Table I. As can be seen from the data, there was a preponderance of cefazolin used, which can be explained from the types of wounds that were treated (Table II).

Table I. *Antibiotics Used.*

Name of Antibiotic	No. Ordered (%)
Cefazolin	86 (56.9)
Cimetidine	11 (7.3)
Gentamicin	10 (6.6)
Ceftriaxone	8 (5.3)
Metronidazole	8 (5.3)
Ampicillin	6 (4.0)
Oxacillin	3 (2.0)
K Penicillin G	3 (2.0)
Clindamycin	3 (2.0)
Cefoxitin	2 (1.3)
Other*	11 (7.3)
TOTAL	**151 (100)**

*This category consisted of various large volume parenterals.

Table II. *Injuries and Wounds Seen.*

Type of Injury/Wound	No. (%)
Shrapnel/GSW	80 (37.9)
Orthopedic	78 (37.0)
Burns	5 (2.4)
Other*	48 (22.7)
TOTAL	**211 (100)**

*This other category consists of dehydration, DKA, hypothermia cellulitis, and exposure (Iraqi Enemy Prisoners of War).

During Operation Desert Storm, the pharmacy provided 24-hour coverage utilizing two 12-hour shifts. A shift-staff consisted of one pharmacy officer and two or three technicians. Additionally, a pharmacist and three technicians were on call for MASCAL situations. On numerous occasions, the pharmacy staff had three pharmacists and six technicians in addition to the normal staff for the shift. Every other hour, rounds of the hospital were conducted to collect new orders from the eight intensive care, eight intermediate care, and four minimal care wards. The central location of the pharmacy also facilitated the drop off of stat orders by nursing and OR personnel. The nursing staff could communicate either by phone or courier—this person was an inpatient from the minimal care ward utilized primarily by the day shift for medication order delivery if and when needed. Orders were screened for incompatibilities and when patient condition permitted, allergy histories were obtained. A Zenith 248 computer was used for label generation and tracking of IV orders. A manual IV form (Fig 1) was used to record preparation data and to aid the staff in making rounds of the hospital. Since

31st Combat Support Hospital
Pharmacy Sterile Products Order
Saudi Arabia

Drug Name: IV Solution: Sig.:	Ordering Ward: Diagnosis:

Patient Information

Name:
Soc. Sec. #
Allergies:

Date	Times to be given:								

Figure 1. *A manual IV form to record preparation data.*

most orders could be anticipated, antibiotic piggyback solutions were prepared and frozen in advance. Additionally, orders not used on the ward were returned to the pharmacy for recycling. The expiration dates of the medications were monitored to insure timely use. Labels were preprinted for one antibiotic—cefazolin 1 gram in normal saline 50ml, which was either refrigerated or frozen. Outpatient prescriptions were provided through a satellite located in the ambulatory patient care clinic.

By March 4, 1991, the hospital discharged its last inpatient and was given orders to relocate to the 332d Medical Brigade area to prepare for redeployment. While the number of patients seen during the war was less than we prepared for, no one was disappointed. The number and type of patients were not significantly different from what would be seen in a large metropolitan trauma center during a similar time span.

Operation Desert Storm required us to develop a drug distribution system from scratch. It was definitely a test of a logistical system that, until now, had only been conceptualized in computer simulations. Thanks to the diligent efforts of the top leadership in Army pharmacy and medical logistics, cooperation with the pharmaceutical industry, and the untiring efforts of the soldier/technicians who worked with us, we were able to provide timely and effective service to our patients. What even now seems hard to comprehend is how fast everything happened. The logo "Desert Storm" characterized the nature of every component of this war—even for the Pharmacy Service of the 31st CSH. ●