

# Project Report on Information Capture of Diagnoses and Other Data from Gulf War Hospital Inpatient Records

## Introduction

Responding to concerns raised by veterans, the Department of Defense (DoD), the Department of Veterans Affairs (VA), and other organizations both inside and outside of government have been conducting investigations into possible causes of Gulf War illnesses. All of these investigations have had one thing in common: they looked into illnesses that have been identified, diagnosed, and reported during the post-Gulf War period. However, the only large grouping of records and documentation for illnesses and injuries unequivocally attributed to service during the Gulf War had not been studied. These were the surviving hospital inpatient treatment records from the Gulf War archived at the National Personnel Records Center (NPRC) in St. Louis, Missouri.

In June 1998, the Department of Defense Office of the Special Assistant for Gulf War Illnesses (OSAGWI) began an effort to establish an Inpatient Treatment Records Database inventory of all Gulf War inpatient hospital treatment records archived at the NPRC. Efforts to locate, document, and inventory these records concluded in October 1999 with approximately 28,000 records identified and inventoried. With this new database OSAGWI was also able to assist Gulf War veterans in obtaining copies of an existing inpatient record for the purpose of helping determine eligibility for VA benefits.

In January 2000, the Special Assistant to the Deputy Secretary of Defense for Gulf War Illnesses directed that a theater-wide review of these archived inpatient treatment records be conducted (as part of its mandate to leave no stone unturned in investigating Gulf War illnesses).

Following this decision the Medical Readiness Directorate of OSAGWI initiated contacts with the Naval Health Research Center (NHRC), San Diego, CA; the Patient Administration Systems and Biostatistical Activity (PASBA), United States Army Medical Command, San Antonio, TX; and the Deployment Health Clinical Center (DHCC), Walter Reed Army Medical Center, Washington, DC, to formulate a plan to accomplish this task.

Work began in February 2000 to first determine if the existing archived inpatient records contained sufficient information to make such an undertaking possible; and second, to develop a set of protocol variables which an analyst would absolutely need, probably need, and may need in order to conduct research into Gulf War hospitalizations (Table I).

*Table I.* Data capture protocols.

Protocol Variables
<b><u>Absolutely Need:</u></b>
1. Social Security Number or unique personal identifier
2. Discharge diagnoses (up to four)
3. Admission and discharge dates
4. Beneficiary category
5. Family member prefix
<b><u>Probably Need:</u></b>
1. Race and/or ethnicity
2. Gender
3. Birth date
4. Branch of service
5. Marital status
6. Reserve status
7. Paygrade
8. Duty occupational category (skill)
9. Unit identification code
10. Medical Treatment Facility (MTF) identification
<b><u>May Need:</u></b> (if available)
1. Death
2. Disposition type (duty, transfer, etc.)
3. Diagnosis related group (DRG)
4. Procedure codes
5. Stanag code (cause of injury)
6. Trauma code

In March 2000, representatives from OSAGWI, PASBA, and DHCC conducted a review of randomly selected Gulf War inpatient records at the NPRC and determined that these records could support such a study. They also decided that the study should include all documented hospitalizations to reflect the new reality of fighting wars with large, multi-national, coalition forces.

Unit location information for patients' units of assignment\* developed from previous research by OSAGWI and the Center for Unit Records Reconstruction (CURR) would also be incorporated (Table II). This could, potentially, demonstrate indications of patterns of illnesses and injuries by date(s) and location(s).

**Table II.** Unit & Location Data.

Unit & Location Data	
1.	Unit of assignment (patient's unit)
2.	Unit Identification Code (UIC) (patient's unit)
3.	Unit's Location (Latitude/Longitude in KTO) on: <ul style="list-style-type: none"> <li><input type="checkbox"/> Date of hospital admission</li> <li><input type="checkbox"/> Three days prior to admission</li> <li><input type="checkbox"/> Five days prior to admission</li> <li><input type="checkbox"/> Seven days prior to admission</li> </ul>
4.	Medical Treatment Facility (MTF) (hospital name/designation)
5.	UIC of admitting MTF
6.	MTF location on date of admission
7.	Type admission (direct or transfer)
8.	Identity of gaining MTF (if transferred/evacuated)

In September 2000, the Department of Defense awarded a contract to TRW Inc. to: (1) capture the discharge diagnoses and ICD-9 codes for each hospitalization; and (2) compile a database that could be made available to other agencies for study and analysis reflecting the history of hospitalizations during Operations Desert

\* Unit location is derived from those reported locations of a unit's (UIC) headquarters only. This does not mean that the patient was necessarily physically located with their unit when hospitalized. In the absence of the individual's locations this can be used for general or possible locations only.

Shield/Storm (ODS/S), beginning in August 1990 and ending in August 1991.

## Methodology

Data from the existing OSAGWI Gulf War Inpatient Records Database formed the basis for the project. Initial examination of data from the 28,000 records revealed that approximately one-third to one-half consisted of only partial treatment records or single discharge summary sheets.

The total number of admissions to U.S. military hospitals in the Kuwait Theater of Operations (KTO) during the Gulf War is uncertain, with estimates ranging from approximately 27,000 to over 35,000. The Air Force reported 3,494 admissions<sup>1</sup>; the Navy reported 6,613 admissions<sup>2</sup>; and the Army reported an estimated 19,941 hospital admissions (based upon bed days)<sup>3</sup>. However, an article in the "American Journal of Preventive Medicine, Volume 18. (Number 3S)" reported 21,655 admissions to Army hospitals, citing an analysis of the Army's Individual Patient Data System (IPDS)<sup>4</sup>. Our final accounting of Gulf War inpatient treatment records of admissions in the KTO totaled 22,444 (Table III). The records archived at the NPRC represent approximately 75% of the total reported admissions in the KTO

**Table III.** Hospital Admissions in the Kuwaiti Theater of Operations

Hospitals in KTO	Reported Admissions	Located Records of Admissions	
		(US Military /All Others)	
Army (44)	19,941	14,107	(12,964 / 1,143)
Navy (5+)	6,613	5,038	(4,941 / 97)
Air Force (15)	3,494	3,299	(3,145 / 154)
<b>TOTAL</b>	<b>30,048</b>	<b>22,444</b>	<b>(21,050 / 1394)</b>

OSAGWI had turned its attention to U.S. military hospitals in Europe in the hope of finding additional inpatient records of Gulf War evacuees with no corresponding in-theater record of admission. An

additional 5,563 inpatient treatment records for evacuated Gulf War patients were located (Table IV), of which 1,998 (36%) were newly identified patients with no corresponding record of treatment from KTO hospitals.

**Table IV.** Gulf War Patients Evacuated to Europe

European Hospitals	Total of Gulf War Evacuees	# Evacuees w/no KTO Record
Frankfurt, GE	1,630	575
Landstuhl, GE	189	61
Nuremberg, GE	845	252
Wiesbaden, GE	2,899	1,110
<b>Total Evacuees</b>	<b>5,563</b>	<b>1,998 ( 36% )</b>

The number of Gulf War patients evacuated and admitted to U.S. military hospitals in Europe is also uncertain. The Air Force reported that 8,121 patients had been evacuated to Europe from 12 August 1990 to 31 March 1991, while a report in the March/April 1992 issue of "The Journal of the US Army Medical Department" stated that 11,465 patients were evacuated to U.S. military hospitals in Europe from 27 August 1990 to 31 May 1991<sup>5</sup>. This uncertainty regarding the number of Gulf War patients evacuated from the Gulf to Europe illustrates a degree of confusion that in all likelihood will never be fully reconciled and may best be attributed to the "fog of war."

Evacuated Gulf War patients were identified based upon at least one of the following criteria in a record: (1) an evacuation tag from the KTO; (2) treatment documents from a hospital in the KTO; (3) physician or nursing notes that identify the patient as a Desert Shield/Storm evacuee, or (4) a statement on the discharge summary sheet identifying it as a Desert Shield/Storm patient record.

## Discussion

The data capture operation was conducted at the NPRC's research facility in St. Louis, from mid-November 2000 through early May 2001.

### Organization and Planning

To achieve the contract's objectives six areas of competencies were identified as having to be met:

- A team comprised of medical records specialists, certified medical coders, medical professionals, and program managers was formed.
- A document control system to maintain total accountability of the records was established.
- A process to validate and verify inventory lists, reconcile any discrepancies, and update the control database prior to data capture was developed and implemented.
- A Relational Access Database capture tool for making modifications to the existing OSAGWI database that tracked and captured all changes/corrections to the source data was designed and implemented.
- A process to capture required data, enter it into the proper data fields, provide quality assurance checks, and provide an onsite review, (by a medical professional), of any record(s) where the written diagnoses were unclear in order to render an interpretation of the diagnoses was established.
- A system to apply a correct ICD-9 code to each diagnosis was established and implemented.

### Implementation

The data capture was conducted in the following manner:

- Inpatient records were requested from the NPRC storage area.
- Records were received in accession lots. (The NPRC assigns numbers that identify groups of retired records by hospital).
- Each record was reviewed against the existing OSAGWI inventory listing to validate a 100% match.

- ❑ Revised inventories were prepared reflecting only records actually in each box.
- ❑ Accession, box, and location numbers (the NPRC assigns a sequence, or box, number to each box in an accession, and an alpha numeric number referring to a box's physical location within the storage area) for each record were retained in the database as an assist to veterans wishing to obtain a copy of their record.
- ❑ Data for a newly added record was captured in the tables as it exists in the record. Diagnosis and ICD-9 coding reviews were conducted in the same manner as an existing record; demographic data were validated later.
- ❑ Initial data was captured verbatim (any discharge diagnoses and ICD-9 codes as entered in each record for each hospitalization) from cover sheets or doctors notes directly into data fields on an electronic form.
- ❑ Each record went through a 100% review and verification of all the existing data from the OSAGWI Gulf War Inpatient Records Database against the source (the medical record).
- ❑ A coder reviewed each record to validate, from the treatment notes/discharge summary, the attending physician's stated discharge diagnoses.
- ❑ The coder entered the appropriately worded diagnosis and ICD-9 code for each corresponding diagnosis in the record.
- ❑ All new data, and any changes or corrections to existing data, were entered directly into the database.
- ❑ When the data capture was completed, document control took possession of the boxes, verified and printed a final box inventory, and returned them to the NPRC.
- ❑ Before a record was considered complete and returned to the NPRC, it had gone through at least five separate data validations or quality review steps.

### **Discrepancies in the Demographic Data**

The data derived from the OSAGWI database did

not always match what was in the records. Discrepancies included such things as:

- ❑ Inventory mismatches; improperly entered names; and improperly recorded social security numbers. Discrepancies involving U.S. service members were matched against the Defense Manpower Data Center's (DMDC) Persian Gulf War historical file, and corrections were applied to each file.
- ❑ A total of 4,366 records were deleted from the OSAGWI database (as the records were not present when the physical inventories were completed), and 1,268 new records were added to the database as a result of the inventories.
- ❑ DMDC's historical file of Gulf War participants was not 100% complete. During the project, 645 additional U.S. Gulf War veterans, not previously included in DMDC's file, were identified as having been Gulf War participants.
- ❑ The most common errors encountered during the data capture operation were clerical in nature. Most were associated with names and social security numbers (SSNs) incorrectly recorded by hospital personnel. Most often the errors were resolved by a close examination of the record or verification through the DMDC historical files.

### **Data Production**

After recording the data from inpatient treatment records, names and Social Security numbers (SSNs) of the patients were evaluated for accuracy. Those that did not match DMDC SSNs were further examined. Comparisons were then made between data from individual treatment records and Gulf War era DMDC SSN data. This process searched for DMDC records with similar names and close but not exact SSNs. Obvious discrepancies were then corrected. In some cases, individuals not listed in the Gulf War personnel data file were located in DMDC's Active and Reserve personnel files.

With all SSNs accurately identified, demographic data was now obtainable from DMDC's Gulf War personnel data file as modified by the US Armed

Services Center for Unit Record Research (USSCURR) at Fort Belvoir, Virginia. Next, best-fit unit identifier codes (UICs), developed by OSAGWI and maintained electronically by USASCURR, were applied to the data. With these best-fit UICs applied, the patients' units of assignment locations were available. With this information the approximate whereabouts of most individuals on the day of admission, along with three, five, and seven days before admission, was provided.

**Quality Assurance (QA)**

To achieve maximum accuracy of the data capture and coding operation, each record was subjected to a quality assurance review on a rotational basis insuring at least four QA reviews. This review involved:

- A 100% check of all data (in the database) against the source data (in the records).
- A 100% systemic review of all diagnoses compared to the ICD-9 codes.
- A 10% random check of diagnoses to the ICD-9 codes.
- A 10% random check of all database data against the source record to validate the QA process.

**Personnel**

A total of thirty-three people participated throughout the data capture phase of the project, on either a full-time or part-time basis, from the initial data entry level through final Quality Assurance.

Only Registered Health Information Administrators (RHIA's), Registered Health Information Technicians (RHIT's), or Certified Professional Coders (CPC's) performed ICD-9 coding.

The production process was managed so that no individual performed any QA function on a record that they had previously worked. Medical records specialists performed initial data entry functions; only certified coders performed all ICD-9 coding and QA reviews.

**RESULTS**

The condition of the individual records varied from hospital to hospital, with the overall quality improving as each hospital's operation matured. With few exceptions, sufficient documentation existed in each record to meet the goal of capturing, at a minimum, a diagnosis and a corresponding ICD-9 code.

The information contained in the relational database links diagnoses, personnel, unit and locations data, enabling researchers to do cluster analysis of illnesses and injuries tied to times and places across the entire Gulf War Theater during ODS/S. Following are some broad examples of this data.

At the conclusion of the data capture operation in May 2001, the Gulf War Inpatient Record Database contained 28,007 records of admissions to U.S. military hospitals in the KTO and evacuee admissions to hospitals in Germany (Table V).

*Table V:* Gulf War Hospital Admissions by Country/Group

Country Group	Hospitals in KTO	Hospitals in Germany
US Military	21,050	5,494
US Civilian	300	63
Unknown	135	1
Other Civilians	59	1
Merchant Marines	17	2
Iraqi EPWs	460	0
Coalition Forces	423	2
<b>Total Admissions</b>	<b>22,444</b>	<b>5,563</b>

Gulf War admissions to U. S. Hospitals in the KTO and Germany (KTO evacuees) were heaviest during the period January 1991 through March 1991 peaking in February at 4,658 total admissions (Figure 1).

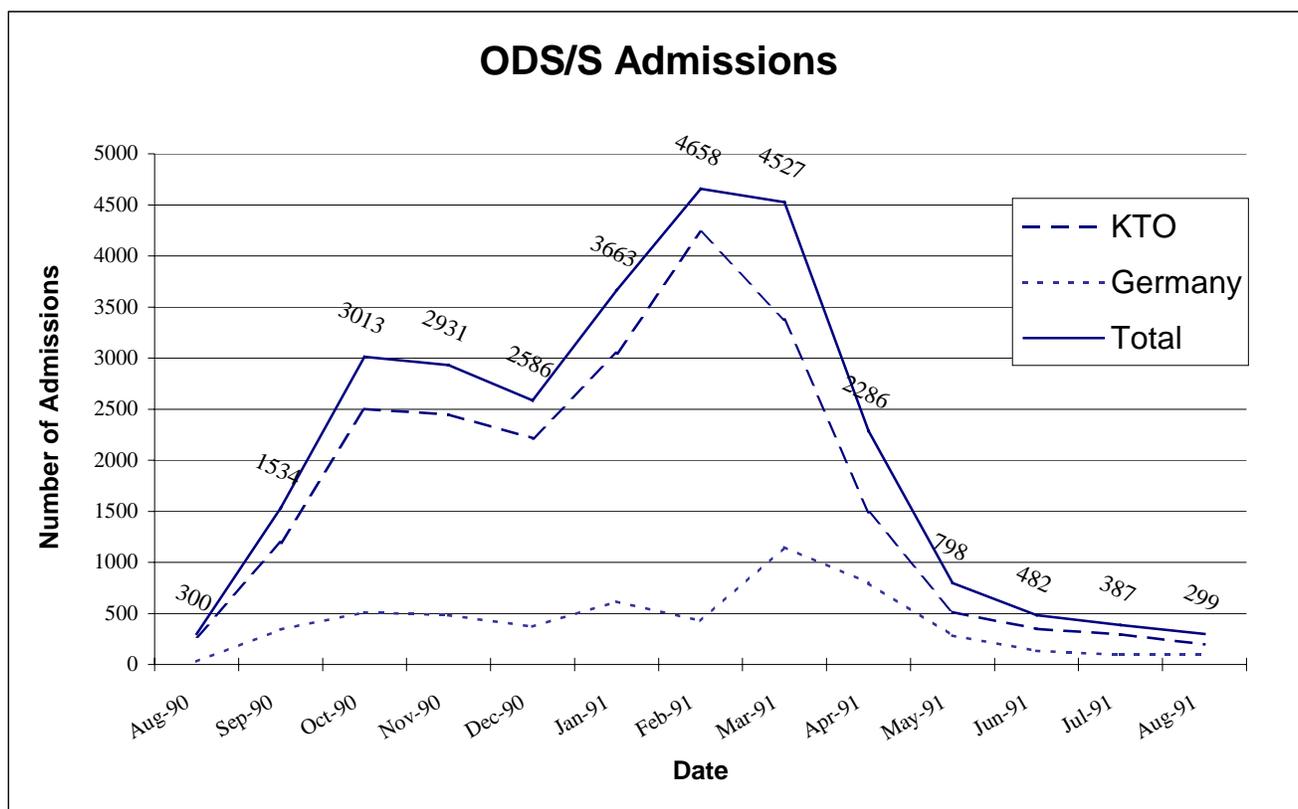


Figure 1: Monthly Admissions to U.S. Hospitals

Of the 28,007 records in the database, 21,050 were United States military personnel admissions to U.S. Military hospitals in the KTO and 5,494 were to hospitals in Germany (Table VI).

Table VI: U.S. Gulf War Hospital Admissions by Branch of Service

Branch of Svc	Hospitals in KTO	Hospitals in Germany
Army	14,746	3,834
Air Force	2,641	464
Marine Corps	2,196	715
Navy	1,445	473
Coast Guard	22	8
<b>Total Admissions</b>	<b>21,050</b>	<b>5,494</b>

The most common primary diagnoses for U.S. service members to be hospitalized in the KTO are

shown in Table VII.

Table VII: Most Common Causes of Hospitalization

Diagnosis	No. Of Occurrences
Gastroenteritis & Colitis	1,493
Lower Back Pain	506
Asthma	367
Unspecified Chest Pain	327
Unspecified Viral Infections	326
Abdominal Pain, Unspecified Site	305
Observation for Other Suspected Conditions	297
Inguinal Hernia Nos., Unspecified	288
Calculus of Kidney	246
Disturbances in Tooth Eruption	209

The most common primary diagnoses for U.S. service members evacuated to hospitals in Germany are shown in Table VIII.

**Table VIII:** Most Common Reasons for Evacuation to Germany

Diagnosis	No. Of Occurrences
Asthma	187
Lower Back Pain	155
Sprain of Cruciate Ligament of Knee	89
Inguinal Hernia Nos., Unspecified	85
Adjustment Reaction w/Brief Depressive Reaction	84
Unspecified Chest Pain	79
Observation for Other Specified Suspected Conds	78
Other Postsurgical Status	65
Encounters for Other Specified Admin Purposes	60
Pain in Joint Involving Lower Leg	59

Linked to each U.S. military patient's admission are best-fit unit identifier codes (UICs). Best-fit UICs represent the best unit of assignment "fit" for each individual, as derived from DMDC historical data. The data are not always accurate. Assignments to other units and temporary duty (TDY) attachments to other units were rarely recorded further compromising accuracy.

Also linked to each U.S. military patient, for this study, is KTO unit location data, maintained by CURR. The various unit locations are generally accurate with some caveats. For example, if a unit reported more than one location for a twenty-four hour period, the first reported location for a given day was used in this application. Also, each location represents only the location of that reporting UIC's headquarters element (or "flag"). The locations of any outlying elements for a particular UIC were not captured.

Mindful of these limitations on unit of assignment and location data, the linking of these to individual patients gives a general indication as to their location on the day of admission to a hospital, and locations three, five, and seven days before admission. This capability, even with its limitations, demonstrates the potential benefits to be realized from maintaining accurate personnel location data, a potential recognized by the Joint Staff's doctrine on Force Health Protection.

August 15, 2001

<sup>1</sup> After Action Report from U.S. Central Command Air Force, Subject: "operations Desert Shield and Storm: Air Force Medical Plans and Operations," November 25, 1991, p. 33.

<sup>2</sup> After Action Report from Commander, U.S. Navy Seventh Fleet, Subject: "Medical Operations During Operation Desert Storm," November 9, 1991, p. 2.

<sup>3</sup> Letter from Chief, Customer Service Division/Patient Administration Systems and Biostatistical Activity, to the Office of the Special Assistant for Gulf War Illnesses, Subject: "Review of the Army Database for Inpatient Care for the Gulf War," November 12, 1997, encl. 2.

<sup>4</sup> Writer, James V., DeFraithe, Robert F., *Keep*, Lisa W., "Non-Battle Injury casualties During the Persian Gulf War and Other Deployments," *American Journal of Preventive Medicine*, 2000, Vol. 18, No. 3S, p. 64-70.

<sup>5</sup> O'Brien, R. M., Sloan, A. M., "Medical support to Desert Shield/Storm: The USECOM Surgeon's Perspective," the *Journal of the U.S. Army Medical Department*, PB 8-92-3/4, Mar/Apr 1992, P. 3-9.