COHORT:
An Integrated Approach to Decision Support for Military Subpopulation Health Care

Col Peter Demitry
Assistant Surgeon General
Modernization Directorate, AF/SGR
**COHORT: An Integrated Approach to Decision Support for Military Subpopulation Health Care**

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The original document contains color images.
Transformation…

Builds on experience…

Matures what we have…

Develops what we need!

I n t e g r i t y  -  S e r v i c e  -  E x c e l l e n c e
Overview

- What is COHORT?
- What is Parallax?
- Why COHORT is different.
- Does it Work?
- A Case Study.
- How did we do it?
- Other applications in medical research.

par·al·lax (par·ə-laks) n.
1. The apparent displacement of an object caused by a change in the position from which it is viewed.
2. (Astron.) The apparent difference in position of a body (as the sun, or a star) as seen from some point on the earth's surface, and as seen from some other conventional point, as the earth's center or the sun.
What is COHORT?

- Composite Occupational Health & Operational Risk Tracking
  - A series of relevant database that have been consolidated into a datamart that allow for the continuous monitoring, analysis and early detection of epidemics, disease trends, and health anomalies among and across an infinite selection of cohorts though a variety of data applications
  - Provides temporal and geographic medical surveillance of every Air Force member from induction through retirement
Parallax to Surveillance Perspectives

- Patient-oriented
- Local
- Real-time

- Disease-oriented
- Local or Global
- Real-time
- Retrospective

- Population-oriented
- Local or Global
- Real-time or retrospective

- Cohort-oriented
- Local or Global
- Real-time or retrospective
- Monitor ANY Cohort

Integrity - Service - Excellence
Integrity - Service - Excellence

Deployment

Assignment

Deployment

Re-Deployment

Operational

Occupational
Troop Exposure

- Exposure to Nuclear Testing
- Agent Orange
- Gulf War Syndrome?
- Operation Iraqi Freedom?
- Occupational Hazards
  - Noise
  - Chemical
  - Work Injury
  - Directed Energy

Integrity - Service - Excellence
How Do We Know The Data Are Accurate?

"...Since 2002, military health officials have reported 22 cases of the disease, with the majority being reported..." - Tyndall AFB, Florida, Gulf Defender, Vol. 62, No 41, Oct 24, 2003

COHORT Case Study

Queries on the COHORT database match compulsory reportable incidences of occurrence
## Current Duty Status of Infected Cohort

<table>
<thead>
<tr>
<th>Deployment Year</th>
<th>Deployed Location</th>
<th>SSN</th>
<th>Deployed (Y/N)</th>
<th>Current Duty Location</th>
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<tbody>
<tr>
<td>2003</td>
<td>IRAQ</td>
<td>148****</td>
<td>N</td>
<td>ROBINS</td>
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<td>233****</td>
<td>N</td>
<td>SPANGDAH</td>
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<tr>
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<td>IRAQ</td>
<td>292****</td>
<td>N</td>
<td>WRIGHT PAT</td>
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<td>IRAQ</td>
<td>300****</td>
<td>N</td>
<td>CSAN</td>
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<tr>
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<td>OTHER</td>
<td>218****</td>
<td>N</td>
<td>LUKE</td>
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<tr>
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<td>OTHER</td>
<td>101****</td>
<td>N</td>
<td>CSAN</td>
</tr>
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<td>OTHER</td>
<td>245****</td>
<td>N</td>
<td>SCOTT</td>
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<td>356****</td>
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<td>377****</td>
<td>N</td>
<td>ANDREWS</td>
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<tr>
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<td>OTHER</td>
<td>434****</td>
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<td>522****</td>
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<td>530****</td>
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<td>573****</td>
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<td>640****</td>
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<td>OCONUS</td>
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<tr>
<td>2003</td>
<td>OTHER</td>
<td>985****</td>
<td>N</td>
<td>UNK</td>
</tr>
</tbody>
</table>
### Who Else May Be Infected?

**CASE #1**
- **FRN**: FG7WC
- **Deployed Country**: Iraq
- **Deployed State**: Kirkuk
- **# Males**: 10
- **# Females**: 2
- **Date Arrived Theater**: 5/7/2003 to 5/9/2003
- **Air Force Career Group**: Operations

**CASE #2**
- **FRN**: AU1N3
- **Deployed Country**: Iraq
- **Deployed State**: Tallil
- **# Males**: 32
- **# Females**: 8
- **Date Arrived Theater**: 4/19/2003 to 4/24/2003
- **Air Force Career Group**: Logistics and Support

**CASE #3**
- **FRN**: FW43J
- **Deployed Country**: Iraq
- **Deployed State**: Kirkuk
- **# Males**: 5
- **# Females**: 0
- **Date Arrived Theater**: 3/7/2003
- **Air Force Career Group**: Support
Not all infected persons develop signs or symptoms of leishmaniasis; but among those who do, times from infection to first clinical manifestations generally range from a week to many months, with much longer periods (e.g., up to 10 years) for visceral infections.

**Could there be “hidden” or latent cases of Leishmaniasis among other documented disease categories?**

<table>
<thead>
<tr>
<th>Disease Category</th>
<th>Cases</th>
</tr>
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<tbody>
<tr>
<td>Abnormal Blood Findings*</td>
<td>23</td>
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<tr>
<td>Contact Dermatitis*</td>
<td>534</td>
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<tr>
<td>Hair &amp; Follicle Disease*</td>
<td>355</td>
</tr>
<tr>
<td>Oth Local Skin Infection*</td>
<td>32</td>
</tr>
<tr>
<td>Oth Skin Hypertro/Atroph*</td>
<td>83</td>
</tr>
<tr>
<td>Other Abnormal Findings*</td>
<td>165</td>
</tr>
<tr>
<td>Other Cellulitis/Abcess*</td>
<td>223</td>
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<tr>
<td>Other Skin Disorders*</td>
<td>201</td>
</tr>
<tr>
<td>Sebaceous Gland Disease*</td>
<td>455</td>
</tr>
<tr>
<td>Skin/Oth Integument Sympt*</td>
<td>454</td>
</tr>
</tbody>
</table>
COHORT Operations

ICDB/GEMS Sites

Secure Connection

Analysis & Alert Services
- Cohort monitoring
- Syndrome detection
- Outbreak detection
- Force health protection
- Research/Threats/Analysis

Oracle 9i AS COHORT Server

Oracle 9i COHORT db Server

EMC Data Store

COHORT Data

Classified

MILPDS

Command Core

M2

GEMS

PIMR

Operational Data Sources (ICDB)

OLAP Database

Real Time
Oracle 9i Application Server

Alerts and Surveillance

Cohort research, monitoring, surveillance, & analysis
- COTS - Custom

Data Extraction and Transfer

Integrity - Service - Excellence
Supported Activities

- Health Modeling Simulation
- Performance Measurement
- Analysis & Forecasting
- Planning & Programming
- Population & Occupational Health Analysis
- Surveillance
  - COHORTS
  - Community Based Surveillance
  - Epidemic Outlook Surveillance Systems (EOS)
  - Telemedicine

1. DMX
2. EMC²
3. SAN

AFMS SG Advanced Assessment and Demonstration Project Database

- Application Server
- COHORT Pipes
- Oracle 9AS, 9i

- Military Personnel Data System (MILPDS)
- Classified SIPRNET Deployment Data
- M²
- Command Core
- Air Force Complete Immunizations Tracking Application (AFCITA)
  - Preventative Health Assessment and Individual Medical Readiness System (PIMR)
- Global Expeditionary Medical System (GEMS)
- Transportation Command Regulating and Control Evacuation System (TRACES)
- Integrated Clinical Database (ICDB)
- OPTIMART MS SQL P2R2 Data Server

In-flight Patient History

Air Evacuation Operations
Patient Tracking and Clinical Feedback Model (PTCFM)
Enable USAF Surgeon General to consolidate, monitor, extract, and analyze real-time medical data from all military health care facilities for earlier detection of epidemics, disease trends, and health anomalies

- Pattern Analysis
- Algorithm Development
- Programmed Alerting
- Protocol Standardization
Respiratory Pathogen Microarray (RPM)

Z-chip from concept to delivery
(Operational from 07 Jun 2003)
Common and biowarfare agents
Iterative design and process
Delivery, evaluation, and validation

Common Pathogens

EOS Pathogen Pie

- Anthrax
- West Nile
- SARS

Up to 500,000 diagnostic tests per chip

Host Response Gene Expression Profiles

- Over 30,000 human genes per test

Real Data

Healthy Sick (FRI)
Integrity - Service - Excellence