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

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Transformation…

Builds on experience…

Matures what we have…

Develops what we need!

EOS

COHORT

CBS

Improved Situational Awareness

Transformational Technologies

COHORT

Transformational Technologies

Transformational Continuum

Standard of Care

Decision Quality Information

Force Protection

Operations Enhanced

Spans Operational Continuum

Integrity - Service - Excellence
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 (p r -l ks )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
Deployment
Assignment
Re-Deployment
Deployment
Troop Exposure

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


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>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>IRAQ</td>
<td>148***</td>
<td>N</td>
<td>ROBINS</td>
</tr>
<tr>
<td>2003</td>
<td>IRAQ</td>
<td>233***</td>
<td>N</td>
<td>SPANGDAH</td>
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<tr>
<td>2003</td>
<td>IRAQ</td>
<td>292***</td>
<td>N</td>
<td>WRIGHT PAT</td>
</tr>
<tr>
<td>2003</td>
<td>IRAQ</td>
<td>300***</td>
<td>N</td>
<td>CSAN</td>
</tr>
<tr>
<td>2003</td>
<td>OTHER</td>
<td>218***</td>
<td>N</td>
<td>LUKE</td>
</tr>
<tr>
<td>2000</td>
<td>OTHER</td>
<td>101***</td>
<td>N</td>
<td>CSAN</td>
</tr>
<tr>
<td>2001</td>
<td>OTHER</td>
<td>245***</td>
<td>N</td>
<td>SCOTT</td>
</tr>
<tr>
<td>2003</td>
<td>OTHER</td>
<td>249***</td>
<td>N</td>
<td>LACKLAND</td>
</tr>
<tr>
<td>2000</td>
<td>OTHER</td>
<td>258***</td>
<td>N</td>
<td>CHARLEST</td>
</tr>
<tr>
<td>2002</td>
<td>OTHER</td>
<td>356***</td>
<td>N</td>
<td>ELLSWORT</td>
</tr>
<tr>
<td>2003</td>
<td>OTHER</td>
<td>377***</td>
<td>N</td>
<td>ANDREWS</td>
</tr>
<tr>
<td>2003</td>
<td>OTHER</td>
<td>434***</td>
<td>N</td>
<td>EGLIN</td>
</tr>
<tr>
<td>2000</td>
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<td>522***</td>
<td>N</td>
<td>MALMSTRO</td>
</tr>
<tr>
<td>2003</td>
<td>OTHER</td>
<td>530***</td>
<td>N</td>
<td>UNK</td>
</tr>
<tr>
<td>2003</td>
<td>OTHER</td>
<td>573***</td>
<td>N</td>
<td>MOODY</td>
</tr>
<tr>
<td>2003</td>
<td>OTHER</td>
<td>576***</td>
<td>N</td>
<td>MACDILL</td>
</tr>
<tr>
<td>2001</td>
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<td>589***</td>
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<td>CONUS</td>
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<tr>
<td>2003</td>
<td>OTHER</td>
<td>640***</td>
<td>Y</td>
<td>OCONUS</td>
</tr>
<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**: 0
- **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
Case For Preventive Intervention?

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>
</thead>
<tbody>
<tr>
<td>Abnormal Blood Findings*</td>
<td>23</td>
</tr>
<tr>
<td>Contact Dermatitis*</td>
<td>534</td>
</tr>
<tr>
<td>Hair &amp; Follicle Disease*</td>
<td>355</td>
</tr>
<tr>
<td>Other Local Skin Infection*</td>
<td>32</td>
</tr>
<tr>
<td>Other Abnormal Findings*</td>
<td>165</td>
</tr>
<tr>
<td>Other Skin Disorders*</td>
<td>223</td>
</tr>
<tr>
<td>Sebaceous Gland Abscess*</td>
<td>201</td>
</tr>
<tr>
<td>Skin/Other Integument Symp*</td>
<td>455</td>
</tr>
<tr>
<td>Other Cellulitis/Abscess*</td>
<td>454</td>
</tr>
</tbody>
</table>
COHORT Operations

ICDB/GEMS Sites

Secure Connection

COHORT Data

Data Extraction and Transfer

Real Time
Cohort monitoring, surveillance & analysis
COTS - Custom

Operational Data Sources (ICDB)

OLAP Database

Alerts

Cohort Research, Monitoring, Surveillance & Analysis

COHORT:

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

Oracle 9iAS COHORT Server

Oracle 9i COHORT db Server

EMC Data Store

COHORT Data

MILPDS
Command Core
M2
GEMS
PIMR

Classification
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

 DMX
 EMC²
 SAN

AFMS SG Advanced
Assessment and Demonstration
Project Database

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

Application Server
Oracle 9AS, 9i
COHORT Pipes

In-flight Patient History
Air Evacuation Operations
In-flight Patient History
Push Reports
Patient Tracking and Clinical Feedback Model (PTCFM)

**Integrity - Service - Excellence**
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

Biowarfare Pathogens
- Smallpox
- Anthrax
- Plague
- Tularemia
- Ebola Virus
- Lassa Fever

Host Response Gene Expression Profiles

Up to 500,000 diagnostic tests per chip
Over 30,000 human genes per test

Real Data
Healthy
Sick (FRI)