Lessons Learned from Health Registries and the Millennium Cohort Study

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Overview

• Introduction

• Background Information
  ➢ Epidemiologic concepts/principles

• Health Registries
  ➢ Definition & examples

• Prospective Cohort Studies
  ➢ Definition & example: The Millennium Cohort Study

• Recommendations

• Discussion
Introduction and Purpose

• Our goal is to present some background information and give you our thoughts about Registries vs. prospective Epidemiologic Studies

• Personal experience rather than comprehensive review
Epidemiology

• Definition: The study of the frequency, distribution, and determinants of health events

• Examples:
  - Car crashes
  - Cardiovascular disease

• “Epi Toolbox”
  - Exposure : Outcome Relationship
  - Multiple ways to study the effect of an exposure on disease occurrence
Epi Tools

- Systematic Review (Meta-analysis)
- Randomized Controlled Clinical Trials
- Cohort Study
- Case-Control Study
- Cross Sectional Study
- Ecological Study
- Case Series
- Case Report
Impactful Events

• Occurrence of visually impactful events that capture the public’s attention in this era of advanced technology with real-time and 24/7 news

• Examples:
  - 1991 Gulf War oil well fires—visually impactful
  - World Trade Center terrorist attack—catastrophic visually impactful event
Response to Major Impactful Events

- Concerns about health effects directly attributable (caused by) a particular event, exposure, or experience
- Leads to many types of responses from legislative, medical/public health, and scientific community
  - Cluster investigation (cancer from environmental exposure)
  - Outbreak investigation (infectious disease)
  - Registries
  - Case-control or cohort studies
Response to Major Impactful Events

- Response to public concerns may include the following pathways among other options:
  - Registry—exposure-based or outcome-based (symptoms or objective health data)
  - Examples
    - Burn-pit (exposure-based)
    - Comprehensive Clinical Evaluation Program (CCEP)
    - Cancer registry (objective data—tissue-based path diagnosis)
  - Cohort Study—group with potential exposure of interest
    - Millennium Cohort Study (self-reported exposures and outcomes)
Health Registries

• Type of data captured
  ➢ Exposure (categories)
  ➢ Self-reported or objective outcome data
  ➢ Symptoms
  ➢ Demographic variables
  ➢ Health risk behaviors
  ➢ Occupational variables

• Numerator data only (case series)
• Comparison group challenging
• Selection bias, recall bias, misclassification bias
Exposure-Based Registries

• Self-reported exposures
  ➢ Point source/cumulative exposure/dose

• Objective exposure measurements assigned to individuals or groups of individuals
  ➢ Burn-pit exposure by military unit location
  ➢ Khamisiyah munitions demolition
  ➢ Agent Orange (Ranch Hand Study)

• Important to achieve as much precision in exposure measurement as possible
  ➢ Misclassification bias
Outcome-Based Registries (Symptoms)

• Often the path of least resistance
• How do patients or population groups get into a registry of this type?
  ➢ Passive or active recruitment
  ➢ Inclusion based on having symptoms

• Advantages
  ➢ Responsive to those with unmet needs
  ➢ May include very detailed objective clinical data
  ➢ Participants may be more motivated to be followed

• Disadvantages
  ➢ Bias
  ➢ Completeness
  ➢ Mixture of people who belong and who do not belong
  ➢ Continuum between very non-specific symptoms and accurate diagnosis
Outcome-Based Registries (Cases)

- Improvement over symptom-based registries in terms of reduced misclassification
- Can include detailed information that can serve as gold standard to evaluate accuracy and reliability of other data sources
- Examples:
  - Automated Central Tumor Registry (ACTUR)
  - Surveillance, Epidemiology, and End Result (SEER) Program
  - Department of Defense (DoD) Birth and Infant Health Registry
  - National Death Index
  - DoD Military Mortality Registry
  - Clinical Disease Registries
Combination Registries

• Both exposure- and outcome-based
• Comprehensive Clinical Evaluation Program
• Lessons learned
  ➢ Need baseline health information to attribute symptoms and clinical outcomes to specific exposure(s)
  ➢ No temporality
  ➢ Media influence
Prospective Longitudinal Cohort Study: The Millennium Cohort

• Prospective, longitudinal study design
  – Includes baseline health information

• Assemble group before event, exposure, experience and follow through time to study health outcome(s) of interest

• Overall purpose of this cohort study: Are there any health effects of military service in general and deployment in particular?
The Millennium Cohort Study

• Established in response to IOM report and Congressional mandate
  ➢ Collect baseline health data, so new-onset health outcomes following a military deployment or other experiences/exposures can be evaluated

• Design of the Millennium Cohort Study
  ➢ Four panels surveyed approximately every 3 years following baseline assessment

• Contributions to the scientific literature
Millennium Cohort Study

• Strengths
  - Internal comparison group
  - Ability to study health outcomes in Guard/Reserve
  - Military service and beyond

• Limitations
  - Large numbers of participants needed to study relatively rare outcomes or diseases with long latency
  - Losses to follow-up
  - Costly
  - Selection and response bias (who tends to respond and participate)
  - Misclassification bias (self-reported exposures and outcomes)
Conclusions

- Registries sometimes established to meet emotional or political mandate, but numerator-based epi method cannot establish causality
  - No denominator data
- Registries cannot serve as a basis for interventions to prevent or reduce adverse health outcomes
- In an ideal world...
Recommendation: The Model Cohort Study

• Build a DoD Military Cohort
• 3-5yr accession panels
• Closely represent whole military population
  ➢ Maximum generalizability
• Clear, objective exposure information available to link to the cohort at the individual level
• Clear, objective clinical outcome information available for linkage
  ➢ Periodic clinical visits (medical records)
Recommendation: The Model Cohort Study

• Compliment Millennium Cohort
• Administration and Funding at OSD-level
• Use Best Practices from other successful cohort studies

• Challenges
  - Following Guard/Reserve populations
  - Follow-up after military separation
  - Cost
Time for Discussion

• Thank you
• Questions / Comments