

## LINKING EXISTING DATABASES: POISONED CHALICE OR HOLY GRAIL?

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## DISCLOSURES

- Dan Huse is an employee of Thomson Reuters. The company's *MarketScan Research Databases*<sup>®</sup> are discussed in this presentation.



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## BACKGROUND: U.S. HEALTH CARE DATA

- Health care delivery in the US is mainly reimbursed on a fee-for-service basis
- Each visit, prescription, procedure, test, etc., generates a transaction record (paid claim)
- Large claims databases are widely available for research purposes
- HOWEVER, limited clinical information is required to justify payment
- HENCE, linkage to more detailed clinical data is valuable



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## EXAMPLE: MARKETSCAN RESEARCH DATABASES

- Claims data from US employers, health plans, and state governments have been linked to:
  - Laboratory test results
    - Electronic data capture from national laboratories
  - Health risk assessments
    - Self-reported data from workplace wellness programs
  - Hospital inpatient records
    - Discharge summaries and detailed service utilization
  - Dates of death
    - From Social Security Administration files
  - Office-based medical records
    - EMR data from general medical practices



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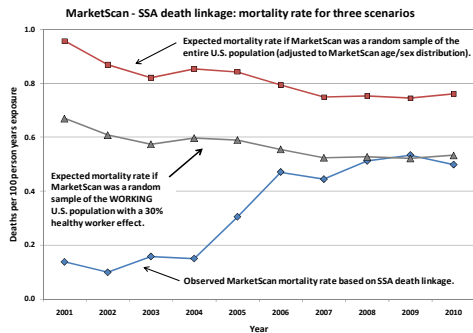
## LINKING TO DEATH RECORDS: HOLY GRAIL?

- Benefits:
  - Mortality is an important outcome of many chronic diseases
  - Death dates will allow us to distinguish complete longitudinal records from censored ones
- Feasibility:
  - Social Security Administration provides records of deaths of persons registered with Social Security
  - Employers represented in MarketScan commonly use Social Security identifiers in health plan records

## LINKING TO DEATH RECORDS: POISONED CHALICE?

- Not all patients have the identifying information to use for linking
  - Exclude records from employers not supplying adequate personal identifiers
  - Exclude records from employers supplying personal identifiers of uncertain accuracy
  - Exclude spouses and children due to data quality concerns
  - Require corroborating evidence, such as name or date of birth
- Observed versus expected death rates varied over time
  - Exclude older data from linkage

## OBSERVED VERSUS EXPECTED MORTALITY



## LINKING TO OFFICE-BASED EMR DATA: HOLY GRAIL?

- Benefits:
  - EMR has clinical information not found in claims
    - Vital signs (e.g. BP, heart rate, temp)
    - Weight, height, BMI
    - Habits (e.g. smoking, alcohol use)
    - Other biometrics (EKG, BMD, FEV, etc.)
    - Laboratory results
    - Prescriptions as written
- Feasibility:
  - Partnership with leading EMR supplier, General Electric
  - Significant geographic overlap between GE and TR data capture

## LINKING TO OFFICE-BASED EMR DATA: POISONED CHALICE?

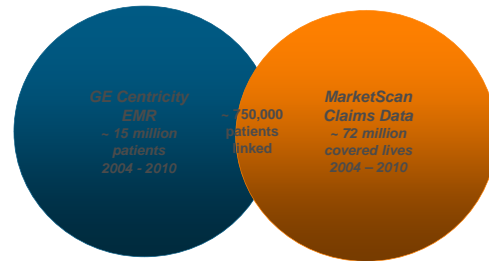
- US privacy laws are barrier to sharing personal identifiers between business partners
  - Also business agreements prevented sharing of physician IDs
- Linkage based on:
  - Month and year of birth
  - Sex
  - ZIP3 (postal code)
  - Dates of physician visits
- Monte Carlo simulations used to estimate and minimize risk of false positive matches
  - Minimum of 3 matching visit dates
- Result is convenience sample biased toward frequent users of medical care

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## RESULTS OF CLAIMS-EMR LINKAGE



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## POISONED CHALICE OR HOLY GRAIL?

- Limitations:
  - Privacy laws and other governance issues often preclude use of personal and provider identifiers
  - Availability of identifiers does not guarantee linkage if data recording is of variable quality
  - Scope of linkage is therefore constrained and subject to selection bias
- Value of linked patient records
  - Rich clinical AND economic data source
  - Transparent linkage methodology and results enables analysts to use data appropriately
  - Over time, linkage methods improve and sample sizes grow

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