Identifying types and causes of errors in mortality data in a clinical registry using multiple information systems

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Introduction

• Intensive Care quality registry
  – NICE registry
  – 2011: 83 Dutch Intensive Care Units (ICUs)
  – Quality indicator: Standardized Mortality Ratio (SMR): Observed/Expected
Research Question

• Investigate:
  – Types and causes of errors in in-hospital mortality data
  – Influence on SMR
Methods (1)

- Re-abstract all mortality data
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  - Resource and time consuming
- Compare to external source
  - Data of 2006-2009, 72 ICUs
  - Deterministically linked with administrative insurance claims database (claims DB)

- List of discrepancies:
  - Under registration of mortality
  - Different date of death
Methods (2)

- Subset of ICUs visited until saturation of error types was reached
  - Varying:
    - % of discrepancies
    - Type of hospital
    - Type of information system
      - Data Entry Module (DEM)
      - Patient data management system (PDMS)

- Subset of ICUs visited until saturation of error types was reached
  - Varying:
    - % of discrepancies
Methods (3)

- Pathway of registration:
  - Most data extracted from DEM or PDMS
    - Data extraction algorithm (DEA):
      - ICU and hospital discharge destination
        » Manually entered into DEM or PDMS
          - Most data extracted from DEM or PDMS
          - Data extraction algorithm (DEA):
            - Hospital Information System (HIS)
              - Died: discharge destination
              - Manually entered into DEM or PDMS
              - Alive: all other destinations including missing value
Methods (4)

- Re-abstracted records with discrepancy
- Check different information systems
• Types of errors:
  – Errors in computer software
  – Manual transcription errors
  – Failure to record outcome data

SMR analysis:
– SAPS II SMR [95% CI]
– Errors in computer software
– Manual transcription errors
Results (1)

NICE data 2006-2009
n= 197,826 records (72 ICUs)

11 ICUs visited
n=32,527 records

n= 140,527 (71.0 %) linked records (72 ICUs)

n= 2,746 (1.9%) discrepancies (72 ICUs)

Claims DB

11 ICUs visited
n= 23,855 (73.3%) linked records

n = 460 (1.9%) discrepancies

n=255 errors (1.1% of linked records) in NICE registry

n=191 errors in claims DB
Results (2)

- **Errors in computer software:**
  - Data extraction algorithm: \( n = 199 \) (78.0%)
  - Manual transcription errors: \( n = 34 \) (13.4%)
  - Failure to record outcome data: \( n = 22 \) (8.6%)

- **Manual transcription errors:**
  - HL7 message not recognized: \( n = 172 \) (86.4%)
  - Revised hospital discharge destination not entered in dataset: \( n = 27 \) (13.6%)

- **Failure to record outcome data:**
  - ICU discharge destination: \( n = 19 \) (55.9%)
  - Hospital discharge destination: \( n = 11 \) (32.3%)
  - Date of death: \( n = 4 \) (11.8%)

- **HL7 message not recognized:**
  - HIS

- **Revised hospital discharge destination not entered in dataset:**
  - HIS
  - DEM/PDMS
  - DEA

- **ICU discharge destination:**
  - HIS
  - DEM/PDMS
  - DEA
  - NICE

- **Date of death:**
  - HIS
  - DEM/PDMS
  - DEA
  - NICE

- **ICU discharge destination:**
  - HIS
  - DEM/PDMS
  - DEA
  - NICE
Conclusion

• Mortality data NICE registry reliable
  – 1.1% error
  – No influence on SMR
• Most errors (78.0%) due to errors in computer software, post ICU in-hospital mortality was 0%
  – Preventable!
   • Regularly test possible malfunctioning of software
   • Build in check that gives warning when post ICU in-hospital mortality is zero

• Using external source to find errors in mortality data more efficient than re-abstraction
Discussion

- 11 ICUs visited: no random sample
- No possibility to check errors in claims DB

- Questions?