NTDB Symposium
Data Validation

Case Validation Project for National Sample Project

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Case Validation Project for NSP

National Sample Project:

- NSP is supported by the NCIPC,CDC and ACS COT
- Stratified sample of 100 trauma centers (NTDB data)

Case Validation study:

- Part of the NSP
- Externally validate selected key elements in NTDB by comparing data in NTDB to data reabstracted by trained coders.
- Study used data with ED admission year 2005

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Case Validation Project

- Ten randomly chosen hospitals from NSP
  - Same strata as NSP:
    - Region
    - Trauma Level
    - NTDB status
- 50 randomized incidents / hospital
  - Stratified by Discharge Status (Dead/Alive)

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Methodology

- Data dictionary
  - Data definition (Same as NTDB)
  - Where in chart to abstract the variable
- Data collection tool
- Hospitals' consent (potential IRB approval)

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Methodology

- Abstractors
  - Training and testing (June 2007, University of Utah)
- Site visits
  - Inter-rater reliability & reliability
- Data analysis in-house at NTDB

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Analysis

- Percent observed agreement
- Kappa score
  - how much the 2 observers agree beyond the level of agreement that could be expected by chance
  - Kappa = $(p_o-p_e)/(1-p_e)$

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Variables abstracted

- Date of Birth
- Gender
- Date of admission
- Arrival time to ED
- ICD9 code of injury
- Ecode
- Lowest GCS eye in ED
- Lowest GCS verbal in ED
- Lowest GCS motor in ED
- GCS assessment qualifier in ED
- GCS total in ED
- Complications
- Comorbidities
- ICU length of stay
- Ventilator support days
- First systolic blood pressure
- First respiratory rate in ED
- Discharge status
- Discharge disposition
- Discharge date

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Considerations

- Directly attainable variables
  - Dates (birth, admission, discharge)
  - Gender
- Indirectly attainable/subjective variables
  - GCS score (notes from Dr)
  - Discharge disposition
    - Revise categories

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Considerations

- Multiple observations per variable
  - Diagnosis codes (multiple injuries)
    - Only trauma diagnoses using Barrell Matrix
    - Match on at least one
  - Complications & comorbidites
    - None/unknown in NTDB
    - Match on at least one complication
      - No complications vs. submitted complications

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Results

- Inter-rater reliability
  - 50 cases abstracted by both abstracters at the first hospital visited
  - Interim analyses done to assure consistency in method of abstracting

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Results
Inter-Rater Reliability

- Observed Agreement: 82% – 100%
- Kappa: 0.776 – 1.000
- All variables excellent agreement
  - Kappa > 0.75

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Results: Inter-Rater Reliability

Variable	% Agree	Kappa (95% CI)
Date of birth	50/50 100%	1.000 (1.000, 1.000)
Gender	50/50 100%	1.000 (1.000, 1.000)
Date of ED admission	47/50 94.0%	0.938 (0.871, 1.000)
Lowest ED GCS Eye	49/50 98.0%	0.963 (0.892, 1.000)
Lowest ED GCS Verbal	49/50 98.0%	0.962 (0.892, 1.000)
Lowest ED GCS motor	49/50 98.0%	0.964 (0.895, 1.000)
Lowest ED GCS total	49/50 98.0%	0.963 (0.894, 1.000)
GCS assessment qualifier	48/50 96.0%	0.927 (0.834, 1.000)
ICU length of stay	48/50 96.0%	0.904 (0.772, 1.000)
Ventilator support days	50/50 100%	1.000 (1.000, 1.000)
First systolic BP in ED	44/50 88.0%	0.876 (0.783, 0.969)
First respiratory rate in ED	41/50 82.0 %	0.776 (0.646, 0.906)
Discharge status	50/50 100%	1.000 (1.000, 1.000)
Discharge disposition	43/50 86.0%	0.804 (0.673, 0.935)
Discharge date	50/50 100%	1.000 (1.000, 1.000)
ICD 9-CM mechanism of injury	50/50 100%	1.000 (1.000, 1.000)
Complications	46/50 92.0%	0.805 (0.624, 0.987)
Comorbidities	49/50 98.0%	0.971 (0.916, 1.000)
ICD 9-CM diagnosis	50/50 100%	1.000 (1.000, 1.000)

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Results: Abstracted Data vs. NTDB

- ***See Handout***

Percent agree and Kappa scores:

- pooled data
- pooled data from Level I trauma centers
- pooled data from Level II trauma centers
- pooled data from all incidents with Discharge Status of alive
- pooled data for Discharge Status of dead

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Results: Abstracted Data vs. NTDB

Pooled data (n=503):

- Excellent for directly attainable variables (Kappa: 0.57- 0.99).
- Low Kappa score (range: 0.05-0.40)
  - GCS Assessment Qualifier
  - ICU Days, Ventilator Days,
  - Complications, Comorbidities, and Diagnosis Code
- Review of variables with low kappa
  - Variability among centers
  - Data mapping (i.e translation of submitted data into NTDB)
  - Field definitions were responsible

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Results: Abstracted Data vs. NTDB

Trauma Level I (n=300) vs II (n=203)

- 95% CI overlapping for most of variables
- Lower for Level I
  - Date of Birth
  - GCS scores (Eye, Verbal, Total)
- Lower for Level II
  - First sys BP
  - First RR

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Results: Abstracted Data vs. NTDB

Discharge Alive (n=453) vs Dead (n=50)

- 95% CI overlapping for most of variables
- Percent agreement lower for all variables but diagnosis code
- Lower for alive
  - GCS Assessment Qualifier
- Lower for dead
  - First RR

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Comments

Who is the ‘Gold Standard’?

- The abstractor
- NTDB data (Registrar at site)

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Comments

Multiple levels of concordance:

1. Abstracted vs. NTDB
2. Abstracted vs. “raw data” into NTDB

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Comments

This study revealed some significant flaws in the process by which data were loaded into the NTDB database in 2005.

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Recommendations

- Standardized data definitions for NTDB data should be adopted.
- A comprehensive quality assurance plan should be developed.
- Training of trauma registrars is needed.
- Periodic data validation projects should be conducted.

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Next Steps

- No mapping with data submitted in 2008 (NTDS)
- Follow-up study
  - Data based on NTDS
  - Case definition

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