The Norwegian Ullevål registry – what have we learnt so far? And, what can others learn from it?

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Objectives

- Ullevål University Hospital (UUH) trauma service – brief introduction
- The trauma registry at UUH (TUUH)
- Aim
- Resources
- What have we found?

UUH Trauma Service

- Major trauma centre, Oslo (550,000)
- Trauma referral centre, health regions East and South of Norway (2.5 million)
- 1,100 trauma admissions each year
- Trauma team activation, 870/year
- Serious injury (ISS > 15), approximately 450 patients (40%)

Aim

- Document trauma service activity and quality
- Quality assurance
  - internal comparison (year by year)
  - benchmarking towards international standards
  - improved medical documentation
- Research
  - trauma registry based studies
  - identification of patients for further research
- Financial gain for the hospital

History

- Custom built registry at UUH
- Operative since August 2000
- Nearly 6000 patients included

Development

- Field selection and definitions based on international experience
  - Major Trauma Outcome Study (MTOS)
  - National Trauma Data Bank (NTDB)
  - Trauma Audit and Research Network (TARN)
  - Regional Trauma registry at Liverpool Hospital, Australia

Data field definitions

- Consensus based if possible:
  - WHO/UN
    - ICD-10 (transport accident, assault)
    - Outcome (death/survival 30 d after injury)
  - National Trauma Data Bank (NTDB, US)
    - Length of Stay, Length of ICU stay, Ventilatory support
- Detailed coding guidelines for each data field

Resources

Formal owner of the registry:

Department of Anaesthesia,

Division of Emergency Medicine, UUH

- Trauma registrar 100% (nurse anaesthetist)
- Trauma registrar 50% (nurse anaesthetist)
- Guidelines: 1000 patients per registrar 100% (Resources for Optimal Care of the Injured Patient – ACS, 1999)

Administration

- Steering committee
- Detailed regulations
  - ownership
  - leader of the registry (physician)
  - how to apply for data
    - aggregated data, anonymized
    - data with personal identification
  - Health Personnel Legislation (Helsepersonelloven §26)
- Approved by the Norwegian Data Inspectorate

Inclusion/exclusion

- Inclusion
  - ISS ≥ 10
  - trauma team activation (TTA)
  - penetrating injury towards torso and/or proximal to elbow and knee
- Exclusion
  - admission > 24 h after injury (unless TTA performed)
  - chronic subdural haematoma
  - isolated extremity fracture
  - drowning, asphyxia

Outcome

Survivor or non-survivor, at which point of time?

- MTOS and NTDB, and most US research
  - ”end of acute care”
- TARN
  - 3 months after injury or by discharge, whichever is the sooner
  - recently changed to 30 days after injury
- UUH
  - 30 days after injury

Outcome definition

Survival or death 30 days after injury:

- A fixed, clearly defined endpoint
- Recommended by UN and EU for use in all transport statistics
- Widely used endpoint in biomedicine

What is the problem?

- TRISS methodology based on US definition of outcome – "end of acute care"
- Recent US research* shows substantial post hospital death within 30 days of injury (unaccounted for in previous research)
  - 14.5% post hospital mortality
- TUUH verifies 30 days mortality via the Norwegian Population Registry
  - results biased in our disfavour when using TRISS

*Clark DE, *J Trauma*. Sep 2004;57(3):501-509.

What have we learnt?

- Data from Patient Administrative System (PAS):
  - a huge amount of inconsistencies and non-logical registrations (ICD-10, surgical procedures)
  - research based on data from PAS may give wrong conclusions
  - Automatic mapping of ICD-10 to AIS/ISS based on PAS data => low data quality

What have we learnt?

- Benchmarking towards a recognized standard is complicated*:
  - validation of the data in the reference population
  - are detailed descriptions of excluded patients published?

*Skaga NO, Eken T, Steen PA *J Trauma*. Mar 2006;60(3):538-547.

The MTOS study, US (1982-1987)

MTOS controlled sites – Blunt trauma

Stratification	Survivors	Dead	Total	% dead
ISS	8960	825	9785	8,43
Ps	8443	665	9108	7,30
Dropouts	517	160	677	23,63

MTOS controlled sites – Penetrating trauma

Stratification	Surv	Dead	Total	% dead
ISS	3966	600	4566	13,14
Ps	3790	507	4297	11,80
Dropouts	176	93	269	34,57

Skaga NO, Eken T, Steen PA *J Trauma*. Mar 2006;60(3):538-547.

ASA-PS predicts mortality

- Comorbidity classified according to: American Society of Anaesthesiology Physical Status Classification System (ASA-PS score)
  - Pre-Injury ASA-PS classification – an independent predictor of mortality after trauma
  - a six level ordinal scale
  - no patients in ASA-PS 5 or 6

Skaga NO, Eken T, Jones JM, Steen PA J.Trauma, in press

ASA-PS predicts mortality

The TRISS model:

- Probability of Survival - Ps

  $b = b_0 + b_1(RTS) + b_2(ISS) + b_3(age\ index)$

  $Ps = 1/(1+e^{-b})$

Our results: (adjusted for ISS, RTS and age)

- Pre-injury ASA-PS 2 OR 1.76 (95% CI 1.14–2.72)
- Pre-injury ASA-PS 3-4 OR 2.25 (95% CI 1.36–3.71)
- No interaction between ASA-PS and the other variables

Economic benefit for the hospital

- Diagnosis Related Groups – DRG
  - Originally developed for Medicare (US)
    - prospective payment system
  - Based on
    - ICD-10 diagnoses
    - surgical procedures
    - age, sex, complications and comorbidities

Economic benefit for the hospital

- Continuous quality control of documentation of ICD-10 diagnoses and surgical procedures
- Compare data in Patient Administrative System (PAS) with data in the trauma registry
- Classify each hospital case into correct DRG group
- Report differences
- Potential economic benefit for UUH since year 2000
  - 3.5 million EURO (28.6 million NOK)

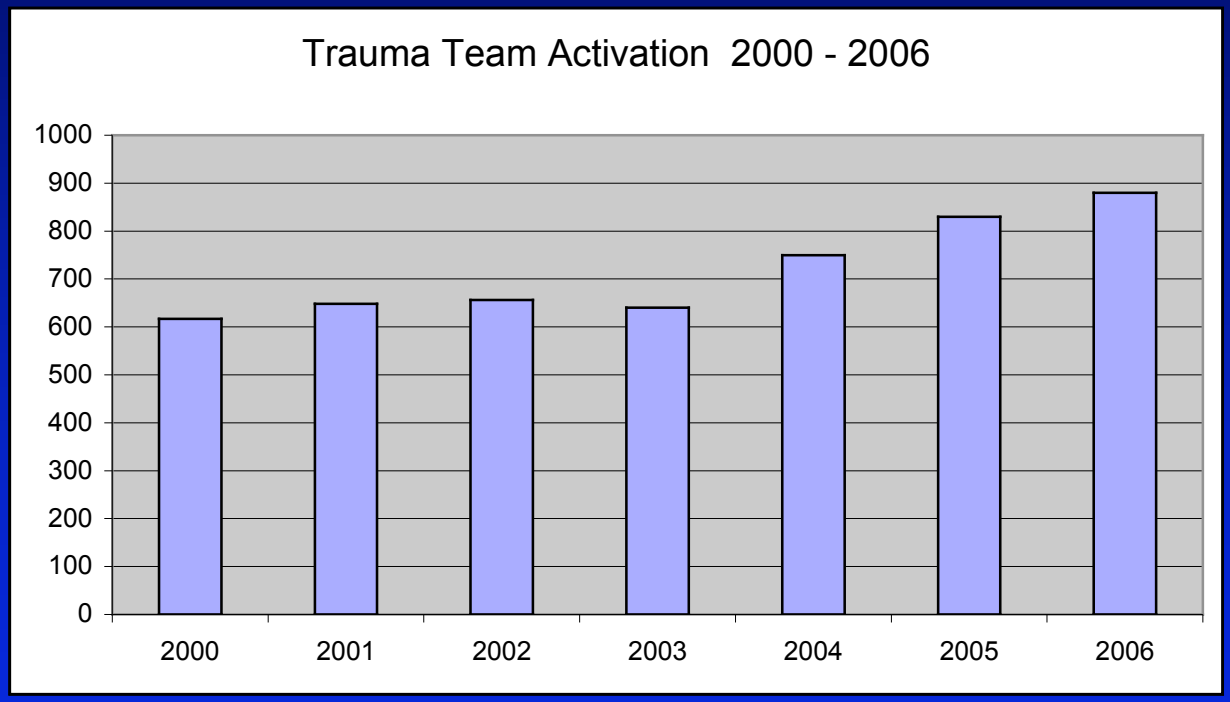
Who want our data?

- Physicians at UUH for research projects
- Norwegian National Trauma Registry
- Public

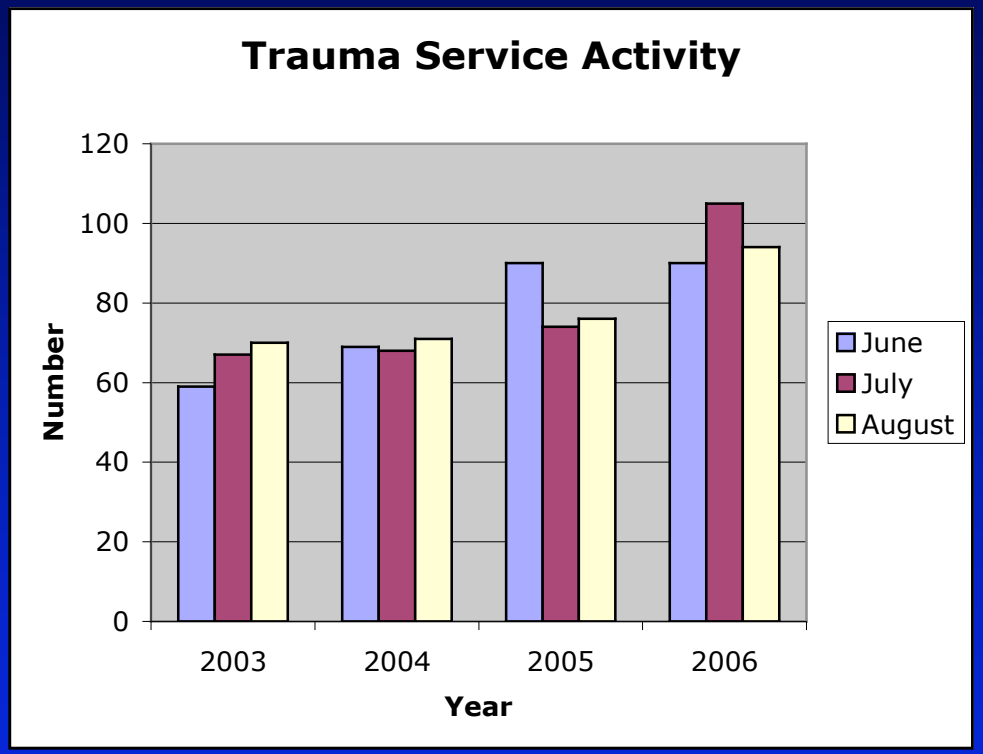
Administrative data, trauma service activity:

- Department of Anaesthesia, UUH
- Division of Emergency Medicine, UUH
- Hospital administration
- Regional health authorities

Trauma service activity



Trauma service activity



Conclusion

- Unique tool for quality assurance
- Unique tool for research
- Possibility for economic gain
- Leave the US based prediction models
- Scandinavian/European prediction model must be developed