

**The Glasgow Outcome Scale – Extended:
A structured approach to assessing outcome
after brain injury**

Lindsay Wilson, UK



**UNIVERSITY OF
STIRLING**



CENTER-TBI

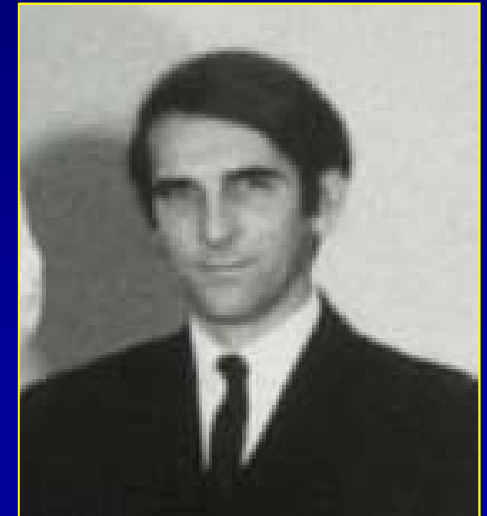
Collaborative European NeuroTrauma Effectiveness Research in TBI
A 2020 vision: Generating knowledge for improving TBI outcomes

Glasgow Outcome Scale

**Assessment of outcome after severe
brain damage: A practical scale**

Jennett B, Bond M

1975 Lancet, 480-484



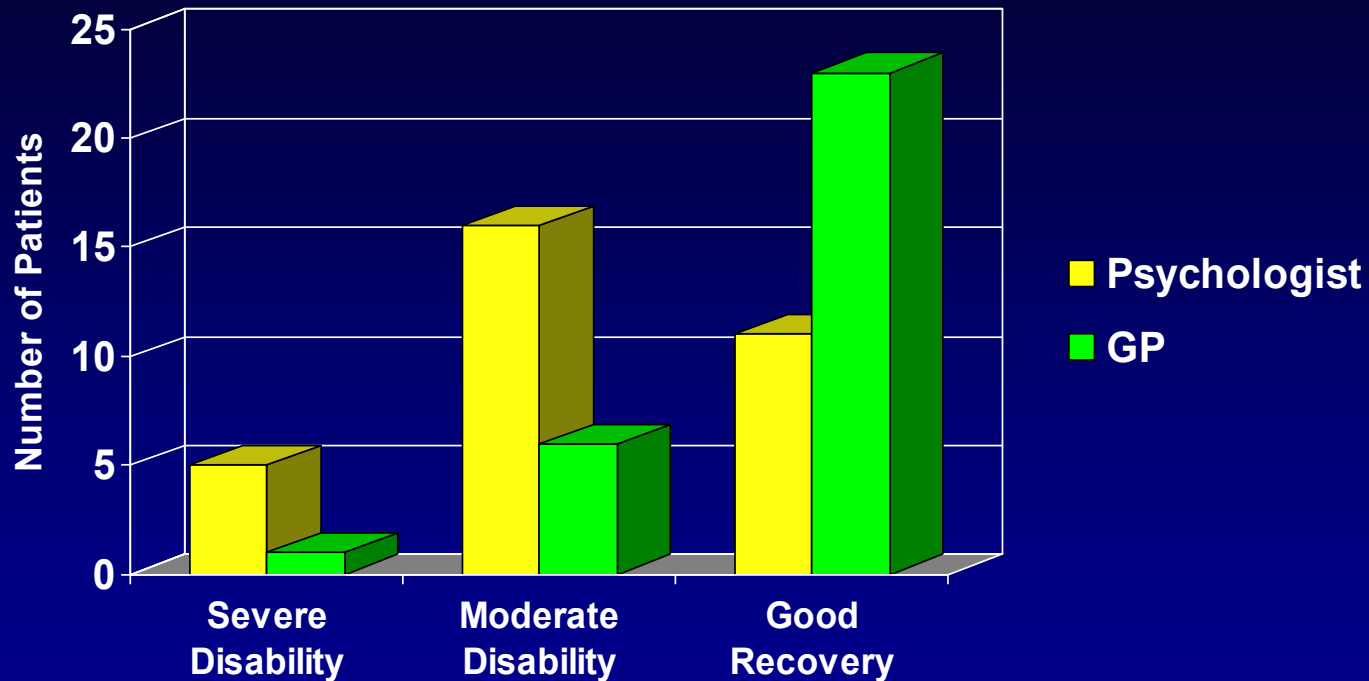
Glasgow Outcome Scale

- “Dead”
- “Vegetative State”
- “Severe disability: **The patient is conscious but needs the assistance of another person for some activities of daily living every day.....**”
- “Moderate disability: ... **Such a patient is able to look after himself at home, to get out and about to the shops and to travel by public transport. However, some previous activities, either at work or in social life, are now no longer possible by reason of either physical or mental deficit....**”
- “Good recovery: **This indicates the capacity to resume normal occupational and social activities, although there may be minor physical or mental deficits.....**”

Expanded scale ..better and worse level within each of the last three categories

Jennett et al (1981) JNNP, 44, 285-293

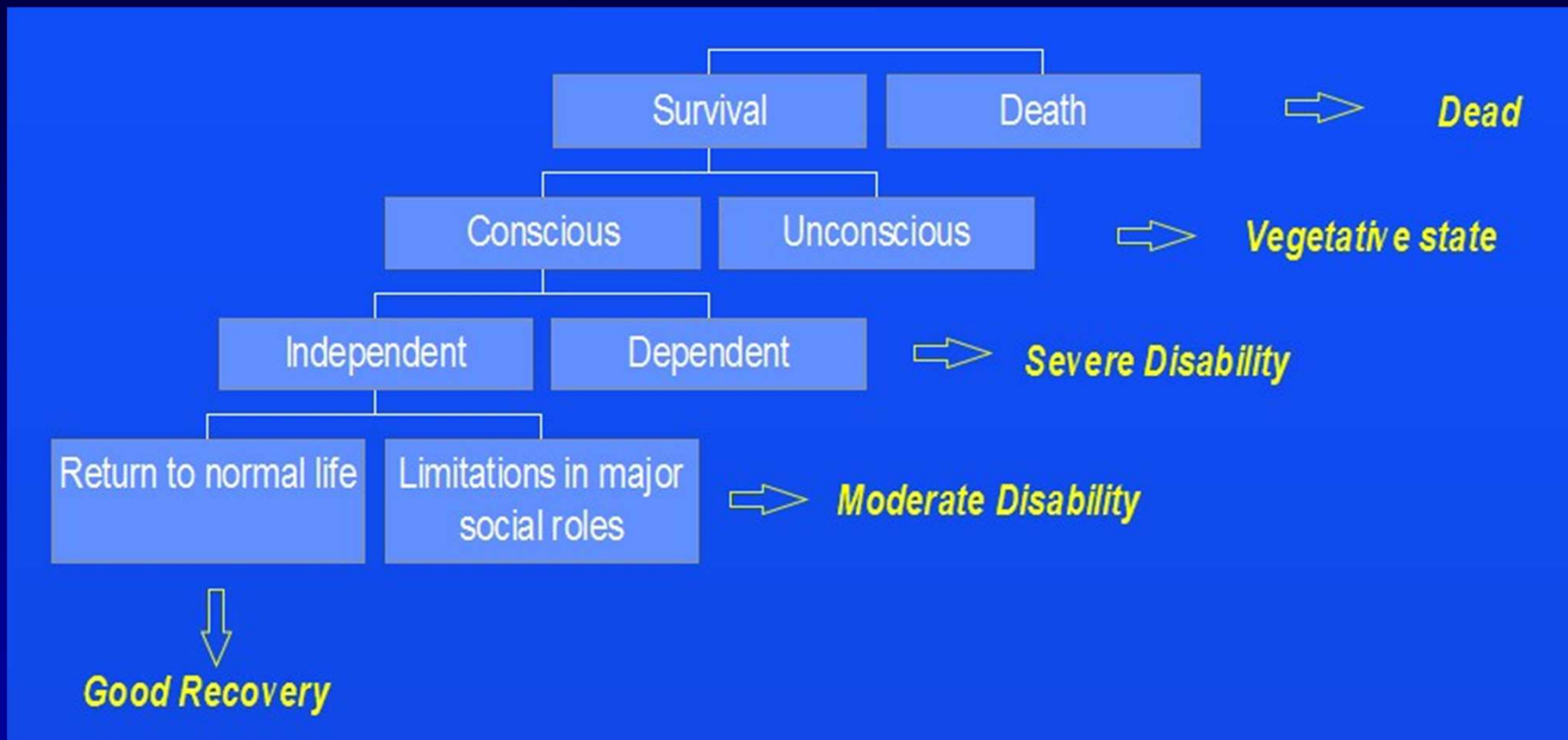
GOS ratings: Psychologist versus General Practitioners



32 head injured patients rated on the GOS at 6 months post injury by a psychologist and by their own GP. Agreement = 50%, Weighted kappa = .31. ('Satisfactory' kappa $\geq .7$)

Anderson et al (1993) Brain Injury, 7, 309-317

Categories of outcome on the Glasgow Outcome Scale



Glasgow Outcome Scale - Extended (GOSE)

Structured Interview: Example extract

CONSCIOUSNESS

1. Is the person able to obey simple commands, or say any words?
 Yes No (VS)

INDEPENDENCE AT HOME

- 2a. Is the assistance of another person at home essential every day for some activities of daily living?
 Yes No If 'No' go to 3
- 2b. Do they need frequent help or someone to be around at home most of the time?
 Yes (Lower SD) No (Upper SD)
- 2c. Was the patient independent at home before?
 Yes No

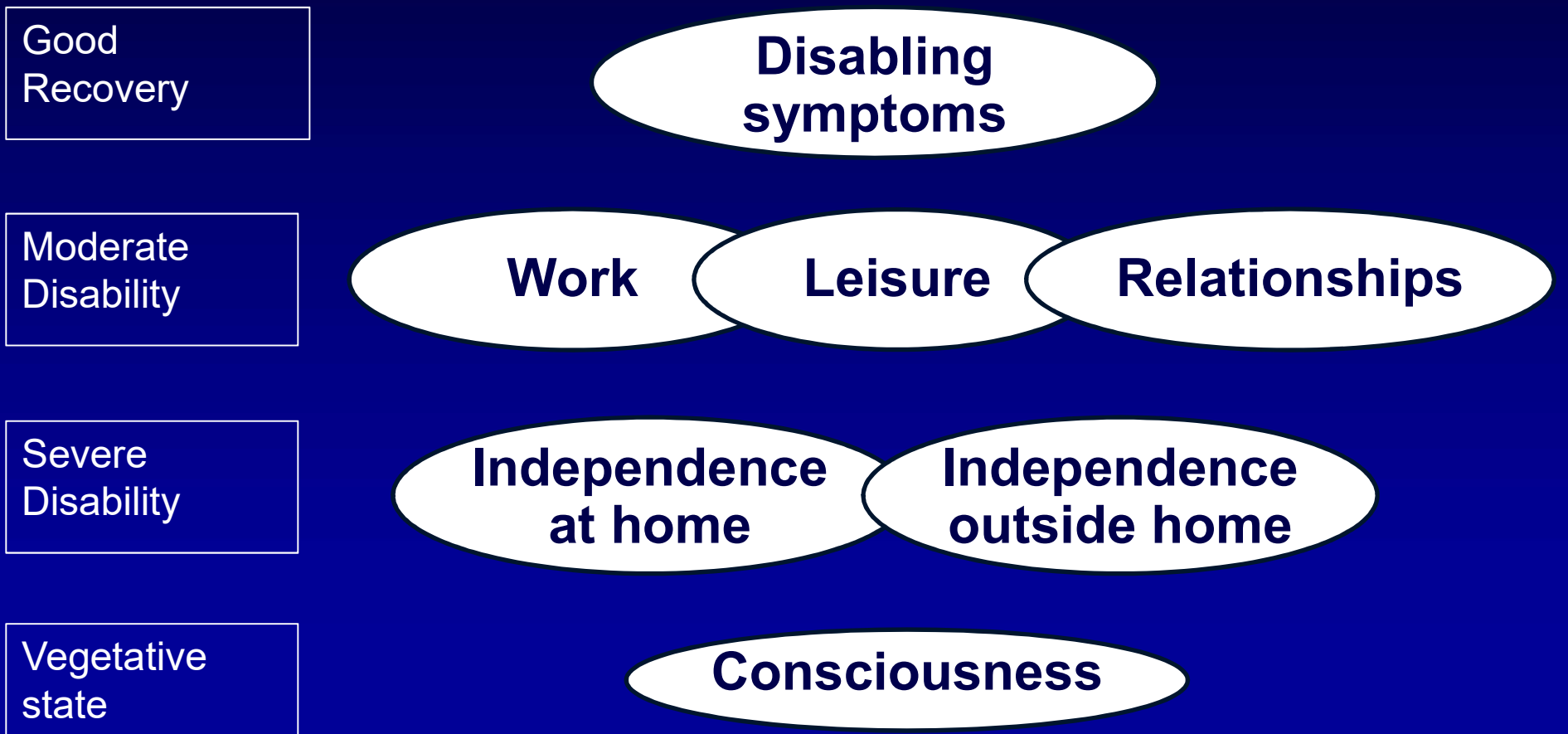
INDEPENDENCE OUTSIDE THE HOME

= Lower Severe Disability

- 3a. Are they able to shop without assistance?
 Yes No (Upper SD)
- 3b. Were they able to shop without assistance before?
 Yes No
- 4a. Are they able to travel locally without assistance?
 Yes No (Upper SD)
- 4b. Were they able to travel without assistance before?
 Yes No

Wilson , Pettigrew & Teasdale (1998) J Neurotrauma, 15, 573-585

GOS/GOSE: Outcome is assessed by change in major domains



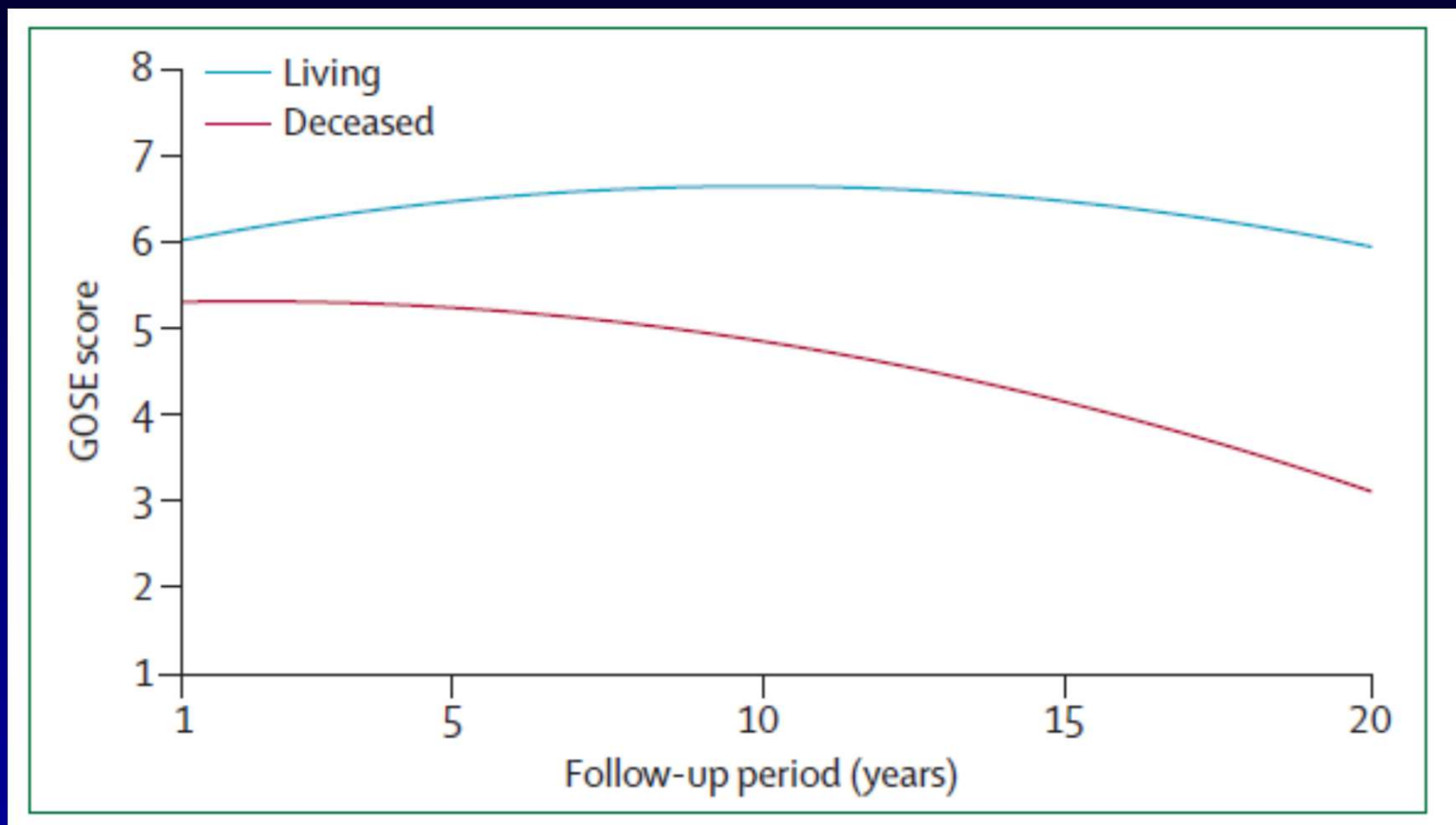
Structured interviews for functional outcome assessment

- **Good inter-rater reliability (*J Neurotrauma*, 1998, 15, 573-585)**
- **Good agreement with other measures, including subjective measures of health outcome after TBI (*JNNP*, 2000, 69, 204-209)**
- **Can be assessed using postal questionnaires (*J Neurotrauma*, 2002, 19, 999-1006)**
- **Can be assessed by telephone interview (*J Head Trauma Rehab*, 2003, 18, 252-258)**
- **Similar approach applied to the modified Rankin Scale for stroke (*Stroke*, 2002, 33, 2243-2246; *Stroke*, 2005, 36, 777 - 781)**

GOSE

- **Single summary covering all outcomes – death to complete recovery**
- **Relatively easy to collect - choice of methods**
- **Focus on change in function – enhances sensitivity to brain injury**
- **Categories on the scale are easily interpreted**
- **Useful for comparing outcomes in groups / predicting outcomes**

Longitudinal outcome trajectories



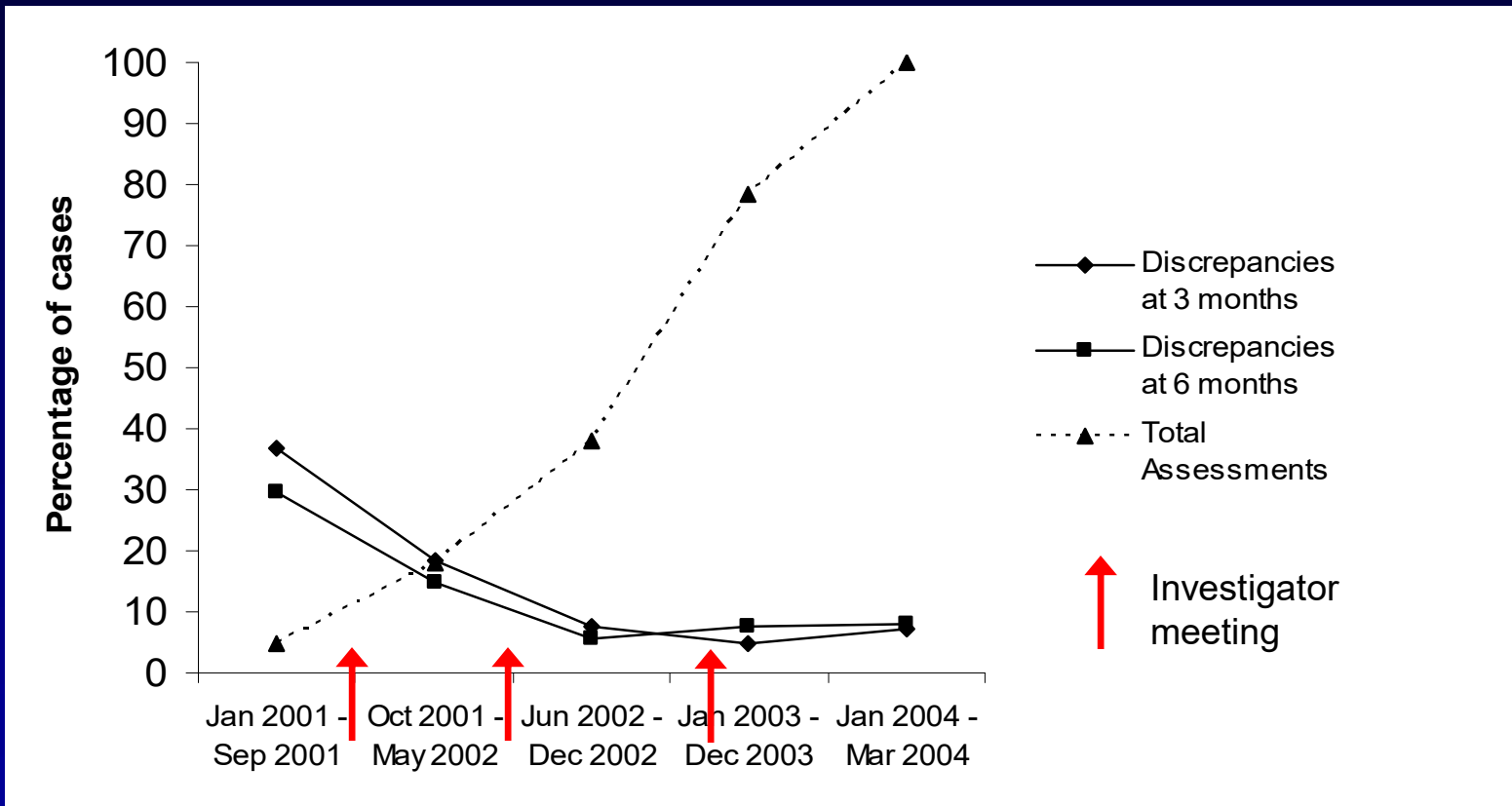
Data from Traumatic Brain Injury Model Systems database. Trajectories based on modelling longitudinal data from 3870 adults who received inpatient rehabilitation (Dams-O'Connor et al, 2015).

From: Wilson et al (in press) The Lancet Neurology.

GOSE - Common issues

- **Broad categories - Insensitive to subtle changes in function.**
- **Ordinal measurement - strategies for analysis**
- **Misclassification of outcomes – particularly with multiple interviewers.**
- **Need for multidimensional outcomes**

Improving GOSE rating accuracy



Assessment of outcome in the Dexanabinol trial: Discrepancies found on central review as the trial progressed.

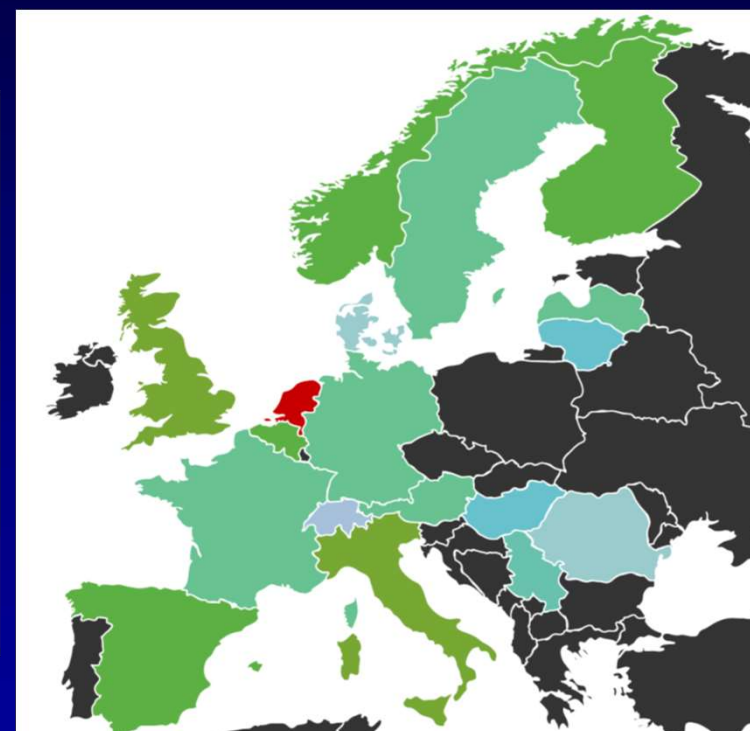
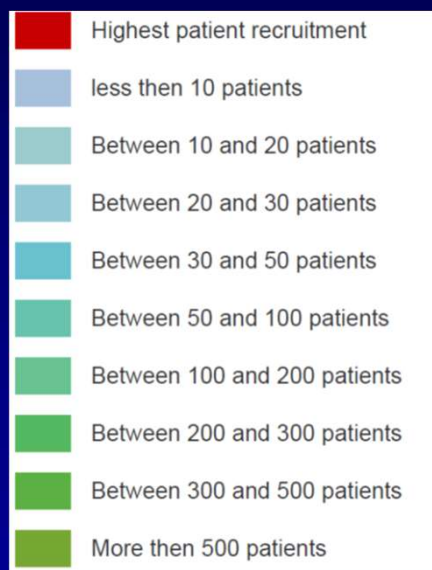
Wilson et al (2007) Neurosurgery, 61, 123-128



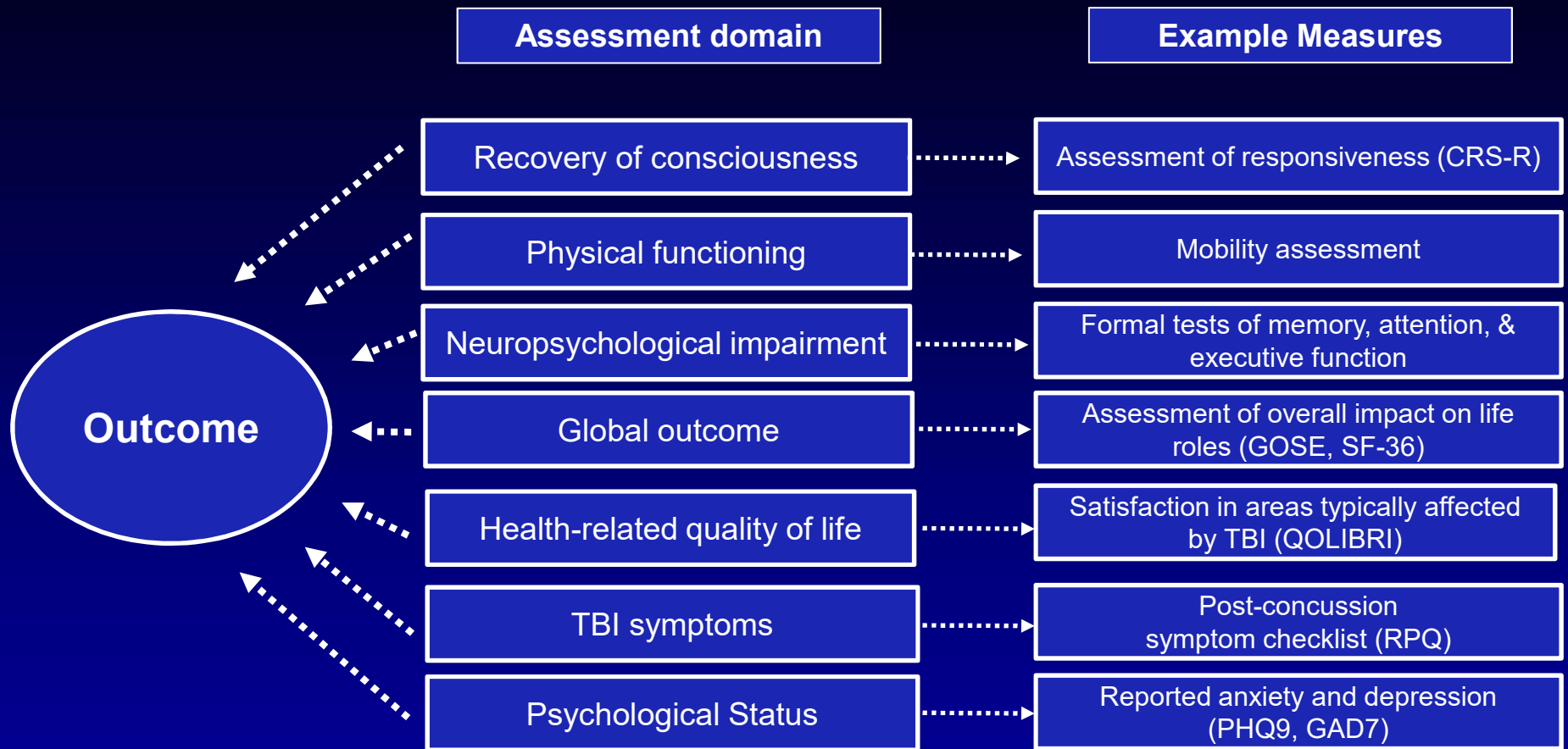
CENTER-TBI

Collaborative European NeuroTrauma Effectiveness Research in TBI
A 2020 vision: Generating knowledge for improving TBI outcomes

- **Observational study of TBI involving 65 sites**
- **Recruitment 4,431 to date**
- **Outcome instruments in 18 languages**
- **Manual of procedures including guide for GOSE**



Multi-dimensional outcome assessment



Common Data Elements for TBI: Seven sub-domains of outcome assessment included in both adult and pediatric the NINDS Common Data Elements for TBI.

CRS-R = Coma Recovery Scale Revised, SF-36 = Short-Form 36, QOLIBRI= Quality of Life after Brain Injury, RPQ = Rivermead Post-concussion Questionnaire, PHQ9 = Patient Health Questionnaire 9, GAD7 = Generalized Anxiety Disorder 7.

Maas et al (in press) The Lancet Neurology.

Conclusions

■ Global outcome assessment

- Structured approaches
- Steps to reduce misclassification, particularly in multi-centre studies
- Ordinal analyses

■ Need for multidimensional outcomes

■ Value of common data elements