

***Does the Glasgow Outcome Score
Predict the
Functional Independence Measure
in Major Trauma Patients?***



OPALS Site Investigators November 2006

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Measuring Patient Outcomes After Major Trauma

- **There is a need to measure more than just mortality in trauma patients**
- **Many tools are available – some complex and costly, other simple and inexpensive**
- **The Functional Independence Measure (FIM) is one tool**
- **Glasgow Outcome Scale (GOS) is another**
- **What could one tell us about the other?**

What is the Glasgow Outcome Score?

- **The Glasgow Outcome Score (GOS) is a simple measure of functional outcome following major trauma**
- **Categories range from 5 (good recovery) to 1 (death)**
- **GOS is useful to Trauma Registries as it is readily obtained from the patient chart**
- **Few data regarding its validity**

What is the FIM Score?

- **The Functional Independence Measure (FIM) score is the gold standard for measuring functional outcome following injury**
- **Well validated - used in many clinical studies**
- **Evaluates independence from 18 [dependent] to 126 [independent]**
- **Requires a trained nurse to administer the 18 item interview directly to the patient or proxy**
- **A lot of work !**

Objective

To determine how well the Glasgow Outcome Score compares with scores obtained using the Functional Independence Measurement system

Methods

- **Prospective cohort substudy of the Ontario Prehospital Advanced Life Support (OPALS) Major Trauma Study**
- **A convenience sample of adult out-of-hospital major trauma survivors treated in one city with mixed BLS-D/ALS EMS systems**

Methods: Intervention

- Major trauma survivors were interviewed at discharge
- GOS and FIM scores were measured



Methods: Data Analyses

Data analyses included:

- **Classification performance (sensitivity and specificity)**
- **Spearman correlation**
- **kappa statistics**

Patient Characteristics (N=733)

Major Trauma Cases

Mean age, yrs	44
 Range	16-94
Male	75%
Mean Trauma Scores	
 Initial GCS	11
 Initial GCS<9	29%
 Initial Revised Trauma Score	6.9
 Injury Severity Score	24

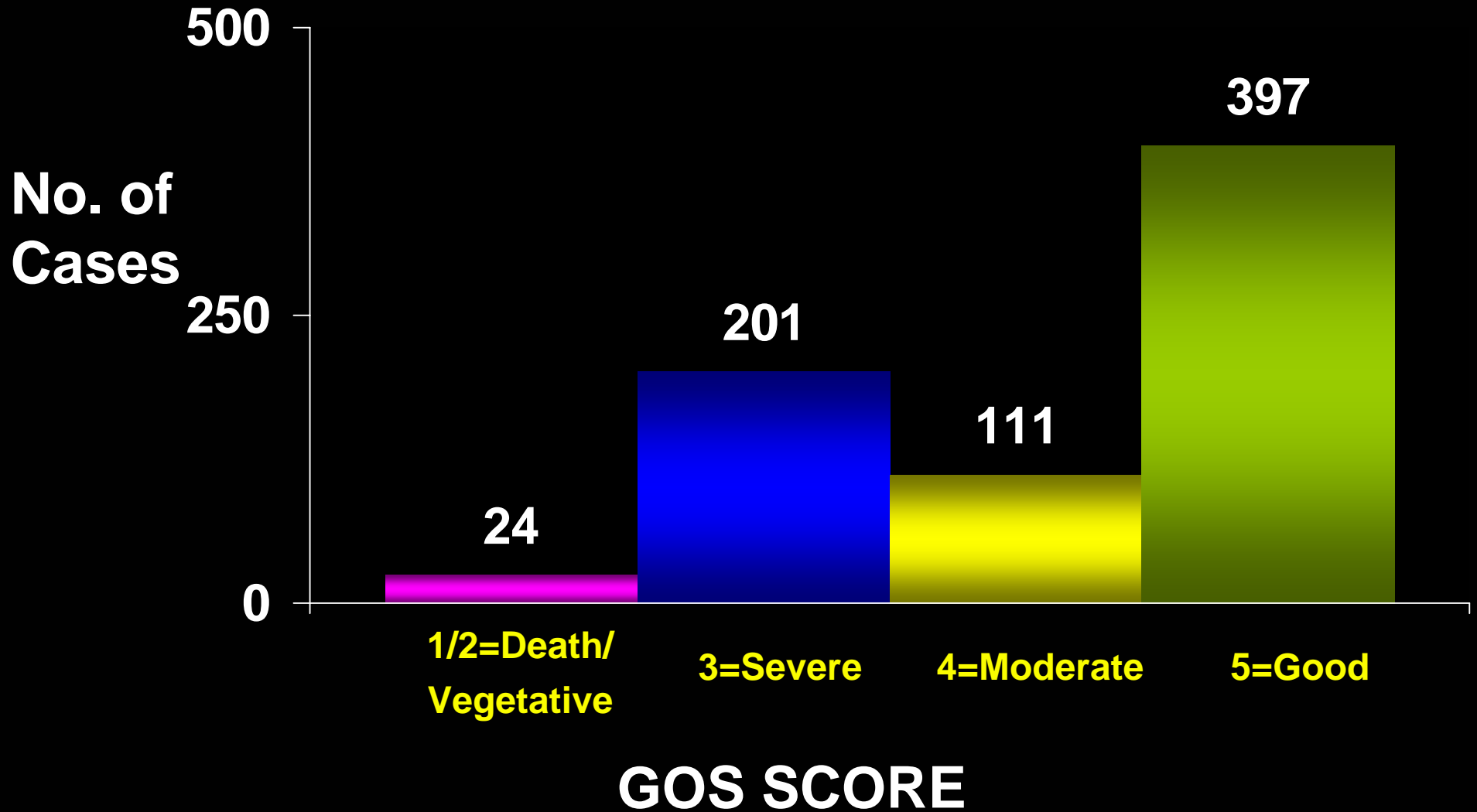
Patient Characteristics (N=733)

Major Trauma Cases

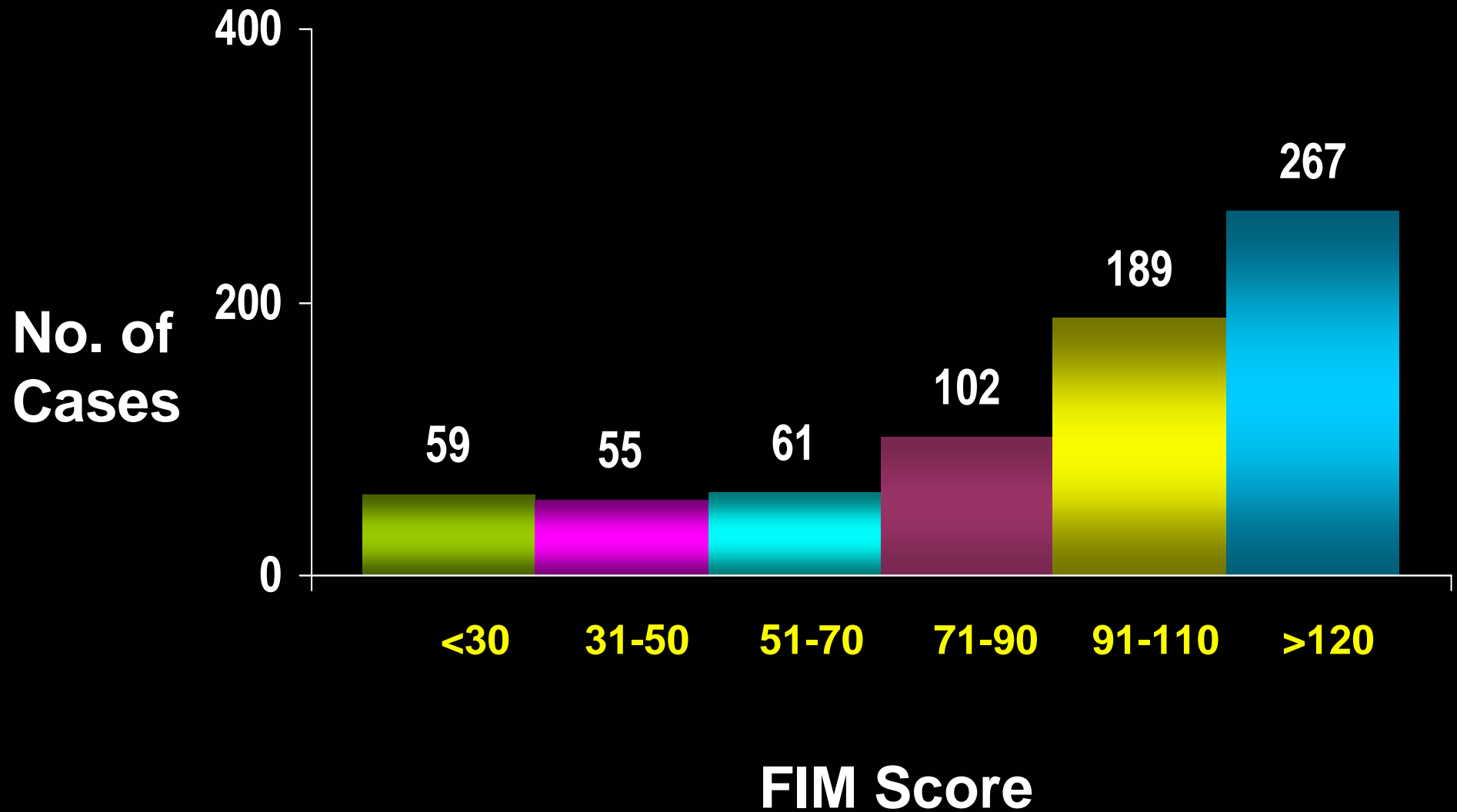
Injury Mechanism

Blunt	98%
Penetrating	2%
EMS Endotracheal Intubation	3%
EMS Intravenous line	3%

Distribution of GOS Scores



Distribution of FIM Scores



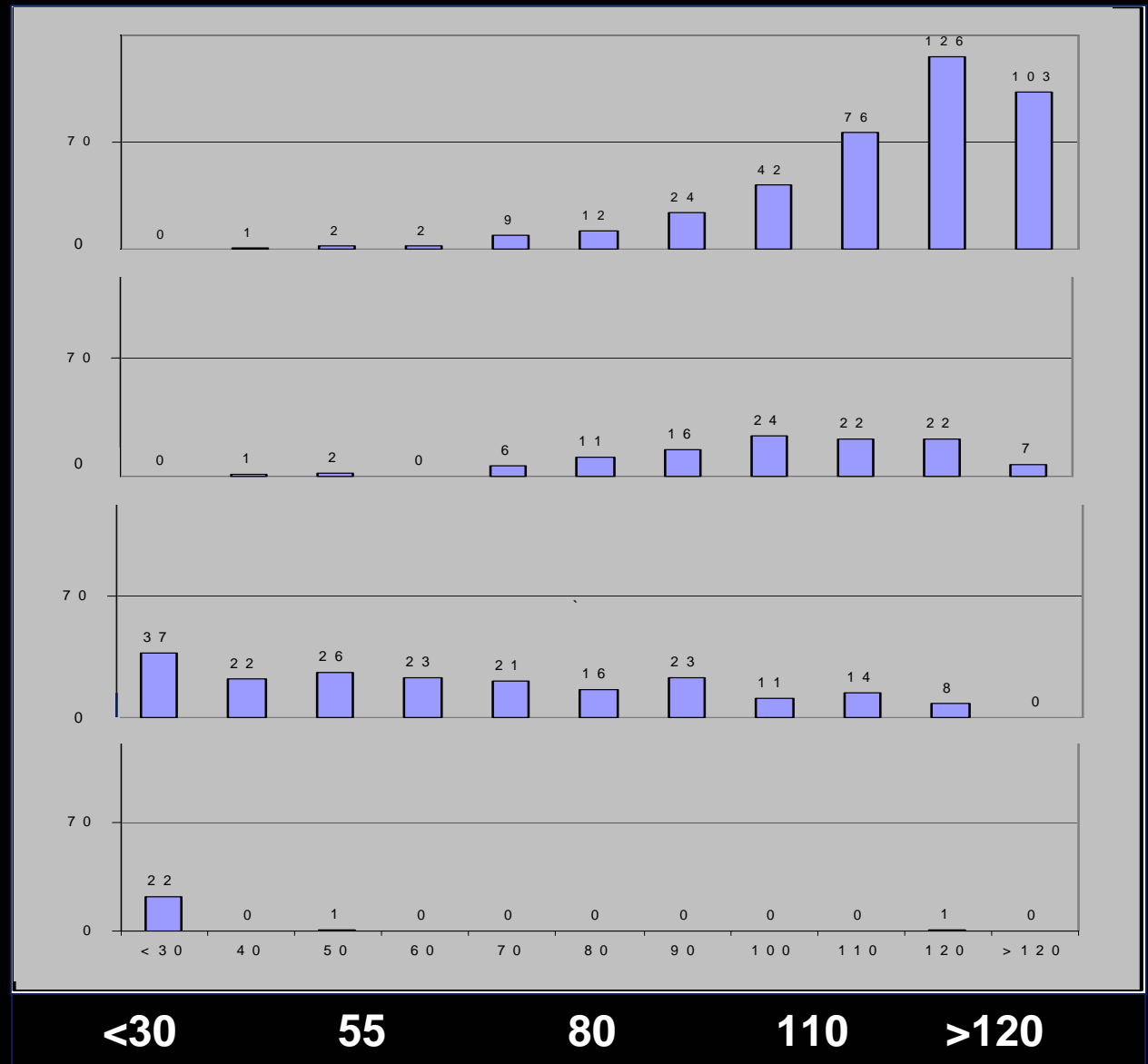
Distribution of FIM by GOS Category

GOS 5 'Good Recovery'

GOS 4 'Moderate Disability'

GOS 3 'Severe Disability'

GOS 1/2 'Dead or Vegetative State'



FIM Score

Univariate Agreement of GOS and FIM Scores

FIM Median 102

GOS Median 5

Agreement Between GOS and FIM Scores

kappa 0.14

Spearman 0.66

Accuracy of GOS for Predicting 'Good' FIM Scores

		<u>FIM</u>	
		≥ 115	< 115
<u>GOS</u>	Good Recovery (GOS = 5)	185	22
	At Least Moderate Disability (GOS < 5)	212	314

Sensitivity 47% (42-52%)

Specificity 94% (91-96%)

PPV 89%

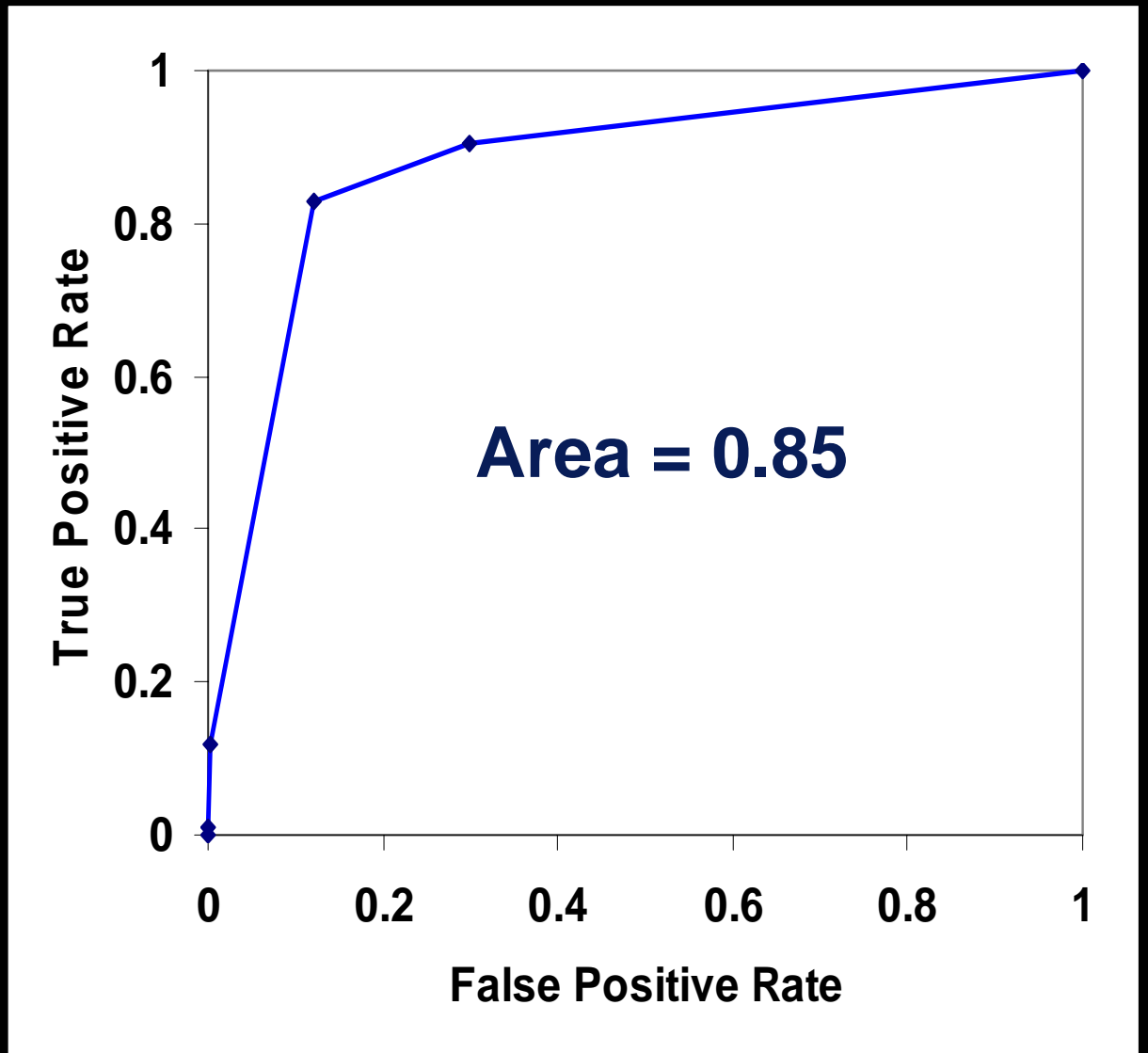
NPV 60%

Accuracy of GOS for Predicting 'Poor' FIM Scores

		<u>FIM</u>	
		<75	≥75
<u>GOS</u>	At least severe disability (GOS ≤ 3)	159	33
	Moderate disability to Good Recovery (GOS >3)	66	475
	Sensitivity	71% (65-77%)	
	Specificity	94% (91-96%)	
	PPV	83%	
	NPV	88%	

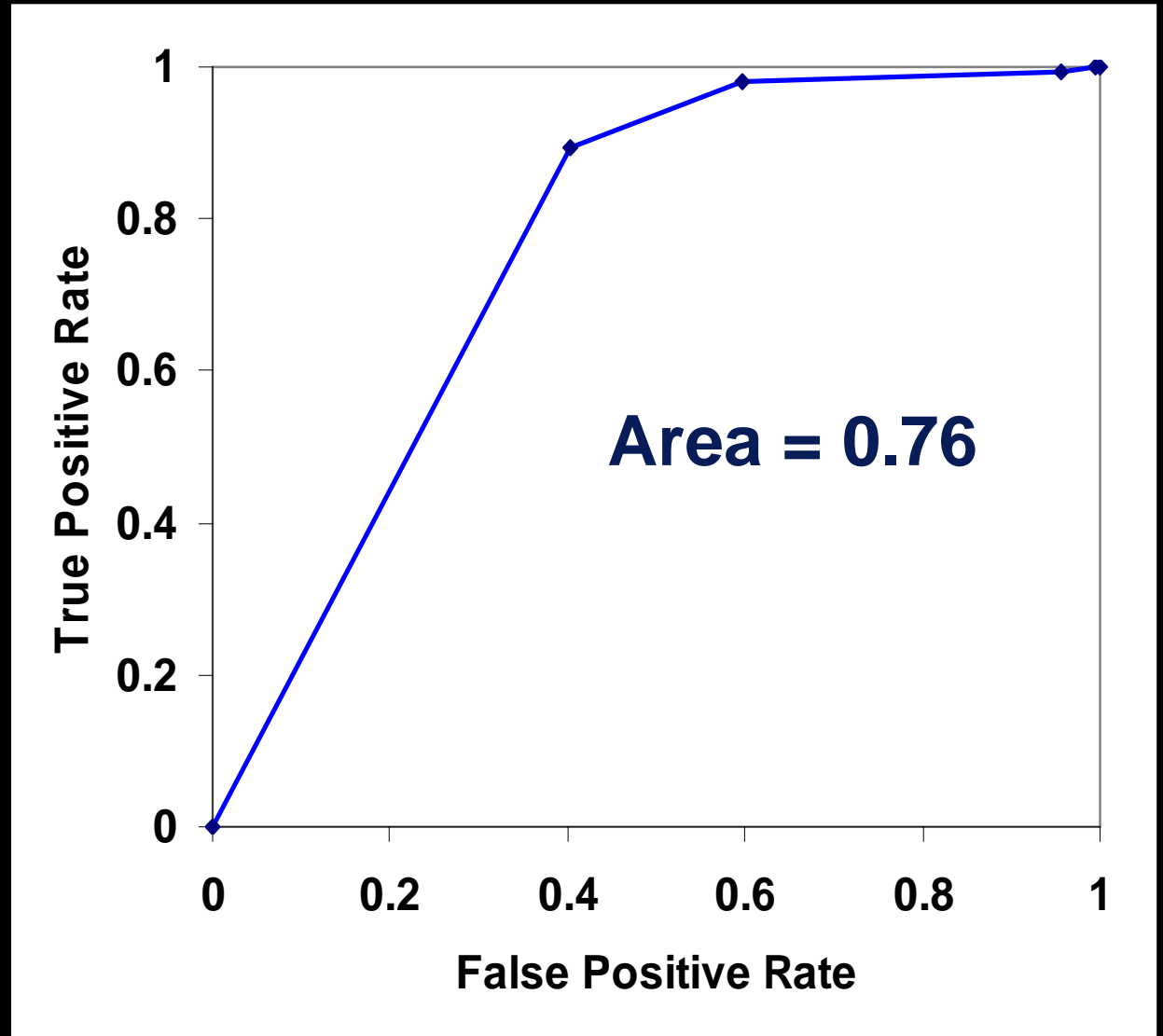
ROC Curve: Discrimination of GOS Levels in Identifying FIM Score

FIM < 75



ROC Curve: Discrimination of GOS Levels in Identifying FIM Score

FIM \geq 115



Discussion

- **54% of patients have good recovery according to the GOS, which is consistent with a median FIM of 102**
- **Distributions showed raters have some difficulty to differentiate moderate vs. severe disability using GOS**
- **Spearman showed fair correlation and kappa association was poor**

Discussion

- **GOS is highly specific to rule in both good and poor FIM scores**
- **Choice of cut points for 'good' and 'poor' FIM scores was arbitrary**

Conclusions

- **This is the first study to compare the use of GOS and FIM instruments in major trauma survivors**
- **Refining definitions of GOS 3 vs. GOS 4 may improve differentiation of moderate vs. severe disability**
- **The GOS appears to be a simple and accurate predictor of functional outcome at discharge and may be used as both a clinical and a research tool for major trauma patients**



Glasgow Outcome Score Definitions

5 – Good Recovery: resumption of normal life despite minor deficits

4- Moderate Disability: Disabled but independent; can work in sheltered setting

3- Severe Disability: Conscious but disabled; dependant for daily support

2- Vegetative: minimal responsiveness

1- Death

FIM Domains and Scoring

Points from each of 6 items are totaled to arrive at a score between 18 (lowest) and 126 (highest) independence:

- 1. Self Care**
- 2. Sphincter Control**
- 3. Transfers**
- 4. Locomotion**
- 5. Communication**
- 6. Social Cognition**

***Is the Cerebral Performance
Category Score a Valid Measure of
Functional Outcome After
Out-of-Hospital Cardiac Arrest?***



OPALS PRG Annual Meeting 2005

CPC vs HUI

- Objective was to determine how well Cerebral Performance Category (CPC) Score compared with scores obtained using the Health Utilities Index Mark 3 (HUI3)
- OPALS Cardiac Arrest Dataset
- First study to compare CPC and HUI3 instruments in 1-year survivors of cardiac arrest
- CPC Score is a fair predictor of functional outcome relative to HUI3 Score
- CPC Score should not be considered a substitute for HUI3 Score for cardiac arrest survivors

What Are We Doing This Year??

**BIPHASIC Trial Cases
2002-2005 (N=256)**

**Non-Cardiac (N=2)
No Data Download (N=7)
Shocked on Asystole (N=26)**

**Received at least 1
Biphasic AED
shock (N=221)**

Died (N=185)

**Survived to
Hospital Discharge
(N=36)**