The Traumatic Brain Injury Model Systems of Care

A project funded by the US Department of Education
National Institute on Disability and Rehabilitation Research
Project Design

- The first prospective, longitudinal multi-center study ever conducted which examines the course of recovery and outcomes following the delivery of a coordinated system of acute neurotrauma and inpatient rehabilitation.

- Includes large scale follow-up to 15 years post-injury.
2007-2012 Project Priorities

Conduct research that contributes to evidence-based rehabilitation interventions which improve the lives of individuals with TBI.
2007-2012 Project Priorities

- Improved long-term outcomes of individuals with TBI by conducting 1-2 site-specific research projects to test innovative approaches that contribute to rehabilitation interventions and evaluating TBI outcomes in accordance with the focus areas identified in NIDRR’s Long-Range Plan.

- Improved outcomes for individuals with TBI by participating in at least one collaborative research module project, which may range from pilot research to more extensive studies.

- Continued assessment of long-term outcomes of TBI by enrolling at least 35 subjects per year into the longitudinal portion of the TBI MS database.
2007-2012 Project Priorities

- In carrying out research activities, each Center may select from the following research domains: Health and Function, Employment, Participation and Community Living, and Technology for Access and Function.

- In addition, each Center must:
  - Provide a multidisciplinary system of rehabilitation care specifically designed to meet the needs of individuals with TBI. The system must encompass a continuum of care, including emergency medical services, acute care services, acute medical rehabilitation services, and post-acute services; and
  - Coordinate with the NIDRR funded Model Systems Knowledge Translation Center to provide scientific results and information for dissemination to clinical and consumer audiences.
TBI Model Systems Leadership

- Federal Project Management
  - National Institute on Disability and Rehabilitation Research, Cate Miller, Ph.D., Project Manager

- National Data and Statistical Center
  - Craig Hospital, Englewood, CO, Cindy Harrison-Felix, Ph.D., Project Director

- TBI Model Systems Centers
  - Executive Committee Chair, John D. Corrigan, Ph.D.
Centers and Key Personnel

- University of Alabama - Birmingham, AL - Thomas Novack, Ph.D.
- Santa Clara Valley Medical Center - San Jose, CA - Jeffery Englander, M.D.
- Craig Hospital - Englewood, CO - Gale Whiteneck, Ph.D.
- The Rehabilitation Institute of Chicago - Chicago, IL - Elliot Roth, M.D.
- Wayne State University - Detroit, MI - Robin Hanks, Ph.D.
- Mayo Foundation - Rochester, MN - Allen Brown, M.D.
- JFK-Johnson Rehabilitation Institute - Edison, NJ - Keith Cicerone, Ph.D.
- Kessler Medical Rehabilitation Research & Education Center - West Orange, NJ - Elie Elovic, M.D.
Centers and Key Personnel (cont.)

- Mount Sinai School of Medicine - New York, NY - Wayne Gordon, Ph.D.
- Carolinas Rehabilitation/Carolinas HealthCare System - Charlotte, NC - Flora Hammond, M.D.
- The Ohio State University - Columbus, OH - John Corrigan, Ph.D.
- Moss Rehabilitation Research Institute - Philadelphia, PA - Tessa Hart, Ph.D.
- TIRR|Memorial Hermann - Houston, TX - Mark Sherer, Ph.D.
- U of TX Southwestern Medical Center/Baylor Institute for Rehabilitation - Dallas, TX - Ramon Diaz-Arrastia, M.D., Ph.D.
- Virginia Commonwealth University - Richmond, VA - Jeffrey Kreutzer, Ph.D.
- University of Washington - Seattle, WA - Kathleen Bell, M.D.
Longitudinal Follow-up Centers

- Georgia Model Brain Injury System/Shepherd Center - Atlanta, GA - Ron Seel, Ph.D.
- Spaulding/Partners Traumatic Brain Injury Model System at Harvard Medical School - Boston, MA - Mel Glenn, M.D.
- TBI Model System of Mississippi/Methodist Rehabilitation Center - Jackson, MS - Risa Richardson, Ph.D.
- University of Pittsburgh Medical Center Traumatic Brain Injury Model System - Pittsburgh, PA - Joseph Ricker, Ph.D.
# Current Center-Specific Research Studies

<table>
<thead>
<tr>
<th>Center</th>
<th>RCT</th>
<th>Questionnaire</th>
<th>Other Design</th>
<th>Topic</th>
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<td>Memory retraining intervention - Memory</td>
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<td>Carbamazepine - post-TBI irritability/aggression</td>
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<td>PA</td>
<td>X</td>
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<td>Quasi-Exp</td>
<td>Dextroamphetamine - attention, mood &amp; functional recovery</td>
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<td>Quasi-Exp</td>
<td>Comparing intensity/duration of care in 2 developed nations</td>
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<td>WA</td>
<td>X</td>
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<td>Secondary Data</td>
<td>Phone intervention for TBI caregivers</td>
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<tr>
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<td>Modeling predictors of outcomes with the longitudinal database</td>
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<td>CO</td>
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<td>Atomoxetine - attention disorders</td>
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<td>Health &amp; wellness intervention - variety of outcomes</td>
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<td>A virtual environment &amp; robotic intervention for improving attention in TBI</td>
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<td>Acupuncture for insomnia after TBI</td>
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<td>Neuroimaging</td>
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<td>Safety/ feasibility of Minocycline in tx of TBI</td>
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<td>Neuroimaging</td>
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<td>MRI techniques in prediction of TBI outcomes</td>
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<td>NJ-JFK</td>
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<td>Neuroimaging</td>
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### Current Center-Specific Research Studies (cont.)

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<td>VA</td>
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<td>Intervention model for family crisis and support</td>
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<td>OH</td>
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<td>Financial incentives - work attendance</td>
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<td>CA</td>
<td>X</td>
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<td>Home-based physical activity program - reduce secondary conditions</td>
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<tr>
<td>NY</td>
<td>X</td>
<td>X</td>
<td></td>
<td>Exercise intervention - cognition, mood and fatigue</td>
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<tr>
<td>NY</td>
<td></td>
<td>X</td>
<td></td>
<td>Sleep &amp; fatigue, monitored via sleep diaries &amp; polysomography</td>
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<tr>
<td>TX-TIRR</td>
<td>X</td>
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<td>Interpersonal process recall treatment - social communication</td>
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<tr>
<td>MN</td>
<td>X</td>
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<td>Advocacy training - participation outcomes</td>
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<tr>
<td>AL</td>
<td>X</td>
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<td>Visual perceptual training - driving screening</td>
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<td>TX-North</td>
<td>X</td>
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<td>Human growth hormone - functional outcomes</td>
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<td>TX-North</td>
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<td></td>
<td>Neuroimaging</td>
<td>Imaging biomarkers of diffuse axonal injury</td>
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**Total (24)**

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2007-2012 Module Projects

- A Prospective Study of the Relationship between Post-TBI Fatigue and Insomnia.
  - NY (lead), CA, NC, NJ-KMRREC, NJ-J FK

- The Natural History of Headache after TBI.
  - WA (lead), MN, AL, TX-North, VA, CO

- Enhancing the TBI MS Core Dataset to Expand Research on Environmental Influences Affecting Outcomes from TBI
  - OH (lead), all centers participating

- Sexuality after TBI.
  - TX-TIRR (lead), CO, MN, NC, MI, IL
TBI MS Collaborative Studies

- TBI Model System Collaborative Study of Amantadine for Post TBI Irritability and Aggression
  - Approximately 29-71 percent of individuals with traumatic brain injury (TBI) experience the problem of irritability and/or aggression which can interfere with interpersonal interaction, relationships and function. The current medical literature does not support standards or guidelines for the management of TBI irritability or aggression. However, pilot research at Carolinas Rehabilitation has revealed that amantadine may reduce irritability and aggression severity and frequency. Flora Hammond, MD, Carolinas Rehabilitation, is the Principal Investigator.
TBI MS Collaborative Studies

- Individualized Planning for the First Year Following Acute Rehabilitation Project

  - This Practice Based Evidence (PBE) study will identify individual differences in demographic characteristics, pre-morbid status, injury-related conditions and medical course that differentially predict the effectiveness of rehabilitation interventions on functional independence, participation and subjective well-being up to 1 year following traumatic brain injury (TBI). The proposal incorporates data being collected for an NIH-funded PBE study focusing only on acute rehabilitation and extends the scope to recovery processes occurring after discharge from rehabilitation. John D. Corrigan, PhD, Ohio State University, is the Principal Investigator.
Definition of TBI

- TBI is defined as damage to brain tissue caused by an external mechanical force as evidenced by medically documented loss of consciousness or post traumatic amnesia (PTA) due to brain trauma or by objective neurological findings that can be reasonably attributed to TBI on physical examination or mental status examination.
Database Inclusion Criteria

- Moderate to severe TBI (PTA>24 hrs or LOC>30 minutes or GCS in ED<13 or intracranial neuroimaging abnormalities)
- Admitted to system’s hospital emergency department within 72 hours of injury.
- 16 years of age or older at the time of injury
- Receives acute care and comprehensive inpatient rehabilitation within the model system hospitals.
- Informed consent is signed by patient, family or guardian.
Database Objectives

- Study the clinical course of individuals with TBI from time of injury through discharge from acute care and rehabilitation care.
- Evaluate the recovery and long-term outcome of individuals with TBI.
- Establish a basis for comparison with other data sources.
NI DRR TBI National Database

- Form I - Acute care: 214 variables
- Form II - Follow-up: 153 variables
- Follow-up conducted 1, 2, 5, and every 5 years thereafter
- Follow-up methods: in-person, phone, mail questionnaire
NI DRR TBI National Database

- Form I - 9642 cases (as of 3/31/2010)
- Form II - 29301 follow-ups* - 21% attrition (5%**)
  - Year 1 – 8,944 – 15% attrition (2%**)
  - Year 2 – 7,767 – 18% attrition (5%**)
  - Year 5 – 5,087 – 21% attrition (11%**)
  - Year 10 – 1,631 – 24% attrition (9%**)
  - Year 15 – 486 – 20% attrition (12%**)
  - Year 20 – 56 – 5% attrition (0%**)

*There are some follow-ups in database that were performed at 3, 4, and 6 years post-injury.

**Additional percent attrition due to loss of center funding.
Study Limitations

- Lack of control or comparison group
- Selection bias in sample: only patients treated in funded Centers
- Lack of uniformity in treatment across all Centers
- Attrition in follow-up
- Inability to systematically track post-acute service utilization
- No further follow-up evaluations if Center defunded
  [in 2007 NDSC began funding defunded centers to continue follow-up]
Research Issues for Variable Selection

I. Premorbid history
II. Demographic characteristics of the population
III. Causes and severity of injury
IV. Nature of diagnoses
V. Types of treatment/services
VI. “Costs” of treatment/services
VII. Measurement and prediction of outcomes including impairment, disability and participation
I. Premorbid History

- Drug Use
- Alcohol use (NHSDA/BRFSS)
- Conditions and limitations
- Psychiatric History
- Arrests/felony incarcerations
- Learning/behavior problems
- Military History
II. Demographic Characteristics

- Age
- Gender
- Race
- Marital Status
- Residence
- Zip Code
- Living with
- Level of education
- Employment
III. Causes of Injury

- Date of injury
- ICD-9 external cause of injury codes
- Blood alcohol level (limited data)
III. Severity of Injury

- Glasgow Coma Scale Score
- Revised Trauma Score
- Duration of unconsciousness
- Duration of Post Traumatic Amnesia
IV. Diagnoses

- Spinal Cord Injury
- Intracranial CT scan findings
- Intracranial hypertension
- Neuropsychological assessment
- ICD-9 diagnosis codes
- Cause of death
V. Treatments

- Surgical procedures
- Rehospitalizations
VI. “Costs” of Treatment

- Length of stay
- Payer source
VII. Measure and Predict Outcome at Follow-up

- Impairment
  - Mortality
  - Lifetime History of TBI
VII. Measure and Predict Outcome at Follow-up

- Disability
  - Disability Rating Scale (DRS)
  - Functional Independence Measure (FIM)
  - Glasgow Outcome Scale-Extended (GOS-E)
  - Supervision Rating Scale (SRS)
VII. Measure and Predict Outcome at Follow-up

- Participation
  - Living with
  - Residence (e.g., private home, SNF, AFC, hospital)
  - Address
  - Marital Status
  - Level of education
  - Employment
  - Drug use
  - Alcohol use (NHSDA/BRFSS)
VII. Measure and Predict Outcome at Follow-up

- Participation (cont.)
  - Transportation
  - Arrests
  - Psychiatric problems
  - Generalized Anxiety Disorder Scale (GAD-7)
  - Patient Health Questionnaire (PHQ-9)
  - Satisfaction with Life Scale (SWLS)
  - Participation Assessment (PART)
Sources of Data

- Abstract from medical records
- Pre-existing database
- Specialized data collection forms
- Patient examination/interview/testing
- Family interview
Guidelines for Follow-up

- Follow-up contact attempted with every patient 1st, 2nd, 5th years and then every five years.
- 4 month window for year 1 follow-up, 6 month window for year 2, 1 year window for years 5, 10, 15, . . .
- Patient is primary source of follow-up information; if patient cannot be interviewed, follow-up is attempted with a proxy.
- Methods of follow-up in order of priority: phone, mail questionnaire.
Data Quality Checks

- Data entry screens:
  - Checks for valid codes and correct range
  - Logical checks between variables
  - Consistency checks between variables across time
Data Quality Checks

- User-initiated database reports:
  - Identify cases with errors or blanks
  - Notify of follow-ups coming due
  - Warnings about overdue follow-ups
  - Calculate missing data rates
  - Calculate follow-up rates
Internal Dissemination

- Annual Data Report
- Quarterly Enrollment and Follow-up Target Reports
- Semi-Annual Missing Data Reports
External Dissemination

- World Wide Web Site [www.tbindsc.org]
  - Online Database Syllabus
  - Annually updated TBI Model Systems Powerpoint Presentation
- National/International Presentations
- Journal Publications
Welcome to the NDSC

Login to Site

User Name
Password

- login
- forgot password
- create account

The Traumatic Brain Injury Model Systems National Data and Statistical Center (TBINDSC) located at Craig Hospital in Englewood, Colorado, is a central resource for researchers and data collectors within the Traumatic Brain Injury Model Systems (TBIMS) program. The primary purpose of the TBINDSC is to advance medical rehabilitation by increasing the rigor and efficiency of scientific efforts to longitudinally assess the experience of individuals with traumatic brain injury (TBI). The TBINDSC provides technical assistance, training, and methodological consultation to 16 TBIMS centers as they collect and analyze longitudinal data from people with TBI in their communities, and as they conduct research toward evidence-based TBI rehabilitation interventions.

Below are links to the TBIMS Presentation and TBIMS Update, which has information about the individual model systems and descriptions of the injury and followup data that are being collected.

- 2008 TBIMS Presentation
- 2008 TBIMS National Database Update

Links to other Model Systems
- National Spinal Cord Injury Statistical Center
- Burn Model Systems Data Coordinating Center
- Model Systems Knowledge Translation Center

The TBINDSC, and the TBIMS program are programs funded by the U.S. Department of Education, Office of Special Education and Rehabilitative Services, National Institute on Disability and Rehabilitation Research (NIDRR).
Please select which Form Variables you would like to see. Form I variables are the variables asked about the initial rehabilitation stay. Form II variables are questions asked to an individual at follow-up. Once you select Form I or Form II you have a choice of viewing either the actual fields that the variable group has ("Show Fields"), or you can view the data dictionary page ("Select") for the selected variable group.

Select which form you want to see
- Form I
- Form II

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Model Systems Knowledge Translation Center

www.msktc.washington.edu

Traumatic Brain Injury Model Systems

Traumatic Brain Injury (TBI) Model Systems are funded by the National Institute on Disability and Rehabilitation Research (NIDRR). They are called "model systems" because they are national leaders in TBI care and research. There are only 16 TBI Model Systems across the U.S.

What you can find at this site:

- Map with links to all 16 TBI Model Systems in the U.S.
- Consumer Information on medical and other topics related to living with a traumatic brain injury.
- Systematic Reviews on TBI research topics. Systematic reviews are articles that summarize research on a very specific topic.
- Database of research articles published by the TBI Model Systems since 1991.
- Research projects that the TBI Model Systems are currently conducting.
- TBI resources on the Web.
Model Systems Knowledge Translation Center (MSKTC)

- **Goal 1**: To enhance understanding of the quality and relevance of the SCI, TBI, and Burn Injury Model Systems Programs’ research findings via a systematic review of evidence.
  - MSKTC collaborates with Model System programs to conduct systematic reviews on high priority health topics to inform clinical practice.

- **Goal 2**: To enhance the use of knowledge of advances in SCI, TBI, and Burn injury research among consumers, clinicians, and other end-users of such information.
  - MSKTC conducts research to identify information needs, develops evidence-based consumer information, and provides training and technical assistant to improve information quality and dissemination among model systems.

- **Goal 3**: To create a centralize web-based resource for effective and uniform information dissemination and facilitation of knowledge translation among Model Systems.
  - The MSKTC website provides:
    - Searchable database of Model System research publications
    - MSKTC systematic review summaries and link to articles
    - List and links to all Model Systems, and their research projects
    - Model system evidence-based consumer factsheets
    - Webcasts to improve knowledge translation activities of Model Systems
## Accomplishments thru 2009: TBI Systematic Reviews & Consumer Factsheets

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<th>Completed</th>
<th>In Process</th>
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<tr>
<td><strong>Systematic Reviews</strong></td>
<td><strong>TBI &amp; Headache Interventions</strong></td>
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<tr>
<td>• TBI &amp; Depression Interventions</td>
<td>• TBI &amp; Effectiveness of Comprehensive vs. Targeted Neurobehavioral Strategies</td>
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<tr>
<td>• TBI &amp; Equity with Substance Abuse Brief Interventions</td>
<td>• TBI &amp; Anxiety Measures</td>
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<td>• Driving after TBI</td>
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<tr>
<td><strong>Consumer Factsheets</strong></td>
<td>• TBI and Inpatient Rehabilitation</td>
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<td>• Understanding TBI, Part 1: What happens to the brain during injury and in the early stages of recovery from TBI?</td>
<td>• TBI and Seizures</td>
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<td>• Returning to School after TBI</td>
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<td>• Understanding TBI, Part 2: Brain injury impact on individuals’ functioning</td>
<td>• TBI and Vocational Rehabilitation</td>
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<td>• Understanding TBI, Part 3: The recovery process</td>
<td>• TBI and Balance</td>
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<td>• Understanding TBI, Part 4: The impact of a recent TBI on family members and what they can do to help with recovery</td>
<td>• Headache and TBI</td>
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<td>• Driving after TBI</td>
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<td>• Cognitive Problems after TBI</td>
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<td>• Emotional Problems after TBI</td>
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<tr>
<td>• Fatigue and TBI</td>
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<tr>
<td>• Facts about the Vegetative and Minimally Conscious States after Severe Brain Injury</td>
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TBI MS National Database 
Descriptive Data Summary

[Includes data from 01/01/1989 - 12/31/2008]
Age

- 26-35: 18%
- 36-45: 17%
- 46-55: 14%
- 56-65: 6%
- 66-75: 4%
- 76-85: 1%
- >=86: 1%

mean = 39; n = 9647
Gender

- Male: 74%
- Female: 26%

n = 9647
Race

- White: 68%
- Black: 20%
- Hispanic: 8%
- Asian: 3%
- Others: 1%

n = 9645
Level of Education At Injury

- Less than High School: 30%
- High School/GED: 34%
- Some College: 23%
- Bachelor's Degree or Higher: 13%

n = 9439
Summary

- Demographic Characteristics of the Population
  - Average age = 39
  - Male (74%)
  - Minority population (33%)
  - High school education or less (64%)
Etiology of Injury

- Vehicular: 55%
- Violence: 13%
- Falls: 21%
- Other: 11%

n = 9617
Blood Alcohol Level
At Emergency Department Admission*

- **Positive Unknown Level**: 1%
- **Negative**: 53%
- **1-9 mg/dl**: 2%
- **>=10 mg/dl**: 44%

* excludes cases not tested = 24%

mean = 68.7; n = 6457
Summary

- Causes of Injury
  - Primary cause is vehicular (55%), followed by falls (21%) and violence (13%)
  - High incidence of alcohol-related injuries (44%)
History of TBI Requiring Hospitalization

- Yes: 7%
- No: 93%

n = 8683
Glasgow Coma Scale Score
At Emergency Department Admission*

- Mild: 37%
- Moderate: 16%
- Severe: 47%

mean = 9.4; n = 6692
Revised Trauma Score
At Emergency Department Admission*

- 10 Thru 12: 68%
- 7 Thru 9: 30%
- 4 Thru 6: 2%

mean = 9.9; n = 4776
Duration of Unconsciousness

mean = 8.6 days; n = 8425
Duration of PTA

mean = 24.53 days; n = 7214
Summary

- **Severity of Injury**
  - Few have previous TBI requiring hospitalization (7%) 
  - Average duration of LOC is 8.6 days 
  - Average duration of PTA is 25 days
Mean Length of Stay

* Did not capture leave of absences this year
Mean Charges

- **TOTAL CHARGES:**
  - Acute: $162,799
  - Rehab.: $60,417

- **PER DIEM CHARGES:**
  - Acute: $8,042
  - Rehab.: $2,231
Summary

- Costs of Treatment
  - Average charge is $8,034 per day for acute care and $2,227 per day for inpatient rehabilitation
  - Acute care LOS has remained relatively stable (even increased a bit) and inpatient rehabilitation has declined but not consistently (1998-2008)
  - 36% have government-sponsored rehabilitation care (M’caid/M’care)
Disability Rating Scale

Percentage of Patients

- None: 31%
- Mild: 14%
- Partial: 21%
- Moderate: 22%
- Severe: 24%
- Moderately Severe: 24%
- Extremely Severe: 18%
- Vegetative State: 6%
- Extreme Vegetative State: 2%

Rehab. Admit (n=8825) Rehab. DC(n=8412) 1 Yr. Post-Injury (n=5498)
Disability Rating Scale

Average DRS Score

- **Rehab. Admission** (n=9421)
  - Average DRS Score: 12.29
  - Description: Severe Disability

- **Rehab. Discharge** (n=9417)
  - Average DRS Score: 6.25
  - Description: Moderate Disability

- **1 Yr. Post-Injury** (n=6853)
  - Average DRS Score: 2.82
  - Description: Partial Disability

- **2 Yrs. Post-Injury** (n=5555)
  - Average DRS Score: 2.5
  - Description: Partial Disability
Functional Independence Measure

Average FIM Score

- **Rehab. Admission (n=9219)**
- **Rehab. Discharge (n=9150)**
- **Year 1 (n=6676)**
- **Year 2 (n=5400)**

*Note: The value of n is reflective of Total FIM measure*
Functional Independence Measure

Mean Scores converted to 7-point scale

Complete Independence
Modified Independence
Supervision
Minimal Assistance
Moderate Assistance
Maximal Assistance
Total Assistance

<table>
<thead>
<tr>
<th>Complete Independence</th>
<th>Modified Independence</th>
<th>Supervision</th>
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<td>6.32</td>
<td>6.41</td>
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</tbody>
</table>

Rehab. Admit. (n=9219) | Rehab. Disch. (n=9150) | 1 Yr. (n=6676) | 2 Yr. (n=5400)
Glasgow Outcome Scale-Extended

Year 1 (n=6037)  Year 2 (n=5042)

- Vegetative State: 1% (Year 1), 1% (Year 2)
- Lower Severe Disability: 16% (Year 1), 14% (Year 2)
- Upper Severe Disability: 16% (Year 1), 13% (Year 2)
- Lower Moderate Disability: 13% (Year 1), 13% (Year 2)
- Upper Moderate Disability: 20% (Year 1), 21% (Year 2)
- Lower Good Recovery: 15% (Year 1), 15% (Year 2)
- Upper Good Recovery: 20% (Year 1), 24% (Year 2)
Supervision Rating Scale

Year 1 (n=6186)
- Level 1-Independent: 62%
- Level 2-Overnight supervision: 6%
- Level 3-Part-time supervision: 6%
- Level 4- Full-time indirect supervision: 6%
- Level 5- Full-time direct supervision: 6%

Year 2 (n=5027)
- Level 1-Independent: 67%
- Level 2-Overnight supervision: 6%
- Level 3-Part-time supervision: 6%
- Level 4- Full-time indirect supervision: 5%
- Level 5- Full-time direct supervision: 5%
# Satisfaction With Life Scale

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number</strong></td>
<td>5352</td>
<td>4397</td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>21.02</td>
<td>21.49</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>8.27</td>
<td>8.38</td>
</tr>
<tr>
<td><strong>Min</strong></td>
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<td>5</td>
</tr>
<tr>
<td><strong>Max</strong></td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>
Summary

Disability Outcomes

- DRS indicates improvement in level of disability from SEVERE DISABILITY at rehab. admission to PARTIAL DISABILITY at 1 and 2 yrs. post-injury.
- FIM indicates improvement in functional ability from level requiring MODERATE ASSISTANCE at rehab. admission to MODIFIED INDEPENDENCE at 1 and 2 yrs. post-injury.
- SRS indicates that about 35% of individuals require some level of supervision at 1 and 2 yrs. post-injury.
Summary

Disability Outcomes (cont.)

- Most improvement in level of disability and functional ability occurs during inpatient rehabilitation
- Continued improvement is seen at 1 yr. post-injury
- Level of disability and functional ability appear to plateau between 1 and 2 yrs. post-injury
Residence

- Private: 98% (Injury n=9638), 83% (Rehab. Disch. n=9624), 91% (1 Year n=7134), 91% (2 Years n=5809)
- Other: 2% (Injury n=9638), 17% (Rehab. Disch. n=9624), 9% (1 Year n=7134), 9% (2 Years n=5809)
Marital Status

- Single
- Married
- Divorced/Separated
- Widowed

At Injury (n=9627)
- Single: 47%
- Married: 32%
- Divorced/Separated: 16%
- Widowed: 5%

Year 1 (n=7081)
- Single: 46%
- Married: 31%
- Divorced/Separated: 18%
- Widowed: 5%

Year 2 (n=5720)
- Single: 46%
- Married: 31%
- Divorced/Separated: 19%
- Widowed: 5%
Living Situation

- **Injury (n=9626)**
  - Alone: 18%
  - Spouse/S.O.: 24%
  - Parent(s): 9%
  - Other Family/Relatives: 3%
  - Other: 10%

- **Discharge (n=9592)**
  - Alone: 31%
  - Spouse/S.O.: 35%
  - Parent(s): 12%
  - Other Family/Relatives: 3%
  - Other: 9%

- **Year 1 (n=7107)**
  - Alone: 12%
  - Spouse/S.O.: 34%
  - Parent(s): 11%
  - Other Family/Relatives: 13%
  - Other: 15%

- **Year 2 (n=5757)**
  - Alone: 15%
  - Spouse/S.O.: 33%
  - Parent(s): 10%
  - Other Family/Relatives: 14%
  - Other: 10%

**Note:** The percentages indicate the proportion of injuries or discharges that occurred in each living situation category for the specified time periods.
Summary

- **Participation Outcomes**
  - Most live in a private residence following rehab. discharge (84%)
  - Few live alone at rehab. discharge (3%), with the highest proportion living with parent(s) (36%), or spouse/SO (31%)
  - 28% are employed at 1 yr. post-injury (63% employed at injury)
Conclusions

The TBI Model Systems Program:

- Demonstrates a system of care for TBI
- Performs several types of research
  - Several center-specific clinical trials and other types of studies
  - Innovative module (collaborative) studies
  - A comprehensive longitudinal database already containing over 8,000 cases with up to 20 years of follow-up.