Jean Shelton, MBA, FACHE

CEO, On With Life;

Chair, FABR

Thomas Murphy

CEO Inventive Software Solutions; Chief Information Officer, FABR

James Malec, Ph.D., ABPP Cn, Rp

Chief Science Officer, FABR; Senior Research Professor Emeritus, PM&R, Indiana University School of Medicine; Emeritus Professor of Psychology, Mayo Clinic



Presented at the 2021 American Congress of Rehabilitation Medicine Virtual Annual Conference, September 26-9

Versions of this presentation were also presented at:

Brain Injury Business Practice College Virtual Meeting, February 4, 2021 and

International Brain Injury Association Virtual World Congress on Brain Injury, July 28-30, 2021



I. FABR Organization and Goals

Jean Shelton, MBA, FACHE CEO, On With Life; Chair, FABR



FABR Mission & Purpose

- FABR endevors to create an opportunity for members to pool patient outcome data in a high-quality database project with the eventual goal being to demonstrate the value of rehabilitation and increase access to care.
- The project will allow for not only clinical change data, but ultimately a measure of cost or resource utilization incurred in obtaining the level of clinical change.
- FABR will utilize aggregate membership data in an effort to demonstrate the value of rehabilitation services and to complete research. As a result of the intended use of the data, the database must be established and maintained with the highest levels of credibility.









FABR Founding Members









Progressive Rehabilitation
Associates



Built From Experience

- Past efforts and experiences of founding members
- Collaborative effort with Inventive
 Software Solutions and Dr. Jim Malec
- Work of PARF Pennsylvania Association of Rehabilitation Facilities (PA & NJ) to develop an outcomes benchmarking project and share resources to gather & analyse outcomes data
- Input from other key stakeholders, for example, Dr. Michael Choo, Medical Director Paradigm: demographics and key data elements from a payer perspective



FABR Building Blocks

- Executive Committee & representative voting member from each organization
- Membership agreement and contract with commitment to fund first 2 years
- Research Policy
- Data Use Agreements
- Software and Business Associates Agreements
- Subcommittee structure including:
 Admin. Policy Cmt, Clinical Cmt.,
 Research Committee, etc as
 needed. New Membership
 Committee to identify protocols for
 eligibility and inclusion of new program
 partners.



II. Database Organization and Management

Thomas Murphy
CEO Inventive Software Solutions;
Chief Information Officer, FABR



FABR Demographic Data Forms



FACILITY:CLIE	d Data Element; ** Indicates Desired Data Element ¶ ¶ NT DEMOGRAPHICS – INTERVAL - OutcomeInfo¶ n Rehabilitation Database (Check only if you do NOT want client data included)¶
PERSONAL INFORMA Client Code #: Year of Birth:	" ¶
♦ Type of Funding: Auto Non-capitated Medicare Public: ((Other ♦ Marital Status: No Married I	♦ Indicates Required Data Element; ** Indicates Desired Data Element ¶ FACILITY:
** MEDICAL INFORI Refer to ICD 10 Code Bo The following are the ge ** ICD 10 Primary (BI re Chpt. 2. Neoplasms Chpt. 6. Neoplasms Chpt. 6. Nervous Sy • Meningitit • Epilepsy • Other cor Chpt. 9. Diseases or Chpt. 19. Injury (S00- Other, please specify: **ICD 10 Medical Is: Chpt. 1 Infectious Dis	PERSONAL INFORMATION:

	Required Data Element; ** Indicates Desired Data Element ¶
¶ FACILITY:	
CLI	ENT DEMOGRAPHICS SHEET - FOLLOW UP - OutcomeInfo¶
□ Exclude from	m Brain Rehabilitation Database (Check only if you do NOT want client data included)¶
Note Source o	f Info: Medical Record Patient/Client Report Proxy¶
PERSONAL IN	FORMATION:¶ #:
♦ Year of Birt	♦ Indicates Required Data Element; ** Indicates Desired Data Element ¶
Discharge/E	
♦ Follow Up I	FACILITY:¶
Marital Stat	CLIENT DEMOGRAPHICS SHEET - DISCHARGE - OutcomeInfo¶
At Follow Up:	☐ Exclude from Brain Rehabilitation Database (Check only if you do NOT want client data included)¶
RESIDENTIAL Residence &	PERSONAL INFORMATION:
In Care¶ Setting Acute	♦ Client Code #: ¶
Acute Ca	♥ Year of Birth:
— Rehab H Outpatie	♦ Discharge/End Date:¶
Psych H MTF (Mi	♦ Marital Status:¶ At Discharge: Married LT Union Single Separated Divorced Widowed¶
Setting Post BI Progr	
BI Prgm.	RESIDENTIAL / SERVICES:¶ Planned Residence & BI Services at time of Discharge ¶
BI Prgm. Warrior	In Care:¶
Setting Long	Setting Acute¶ Acute Care Hospital
Skilled N Sub-Acu	Acute Care Hospital ¶ Rehab Hospital¶
Group H Not In Care¶	Outpatient Txpy ¶
Hot III Care	Psych Hospital MTF (Military Treatment Facility)/VA or DOD ¶
	Setting Post Acute¶
	BI Program Residential Rehab/BI Residential Supported Living ¶ BI Prgm. Out.Pt/Home & Community Based
	BI Prgm. Out.Pt/Home & Community Based
	Warrior Transition Program/VA or DOD ¶
	Setting Long Term Care¶ Skilled Nursing Facility /Long Term Care¶
	_ Sub-Acute (some therapy)¶
	Group Home / Assisted Living¶
	Not In Care:¶

FABR Demographics Sheet - Initial



- Personal Information:
 - Birth Yr., Marital Status (pre-injury, at admit), Ethnicity, Race, Funding, Military Experience
- Injury Information:
 - Injury Date, Coma Length (hours, days), Previous Injury, Injury Type and Cause, Severity of Brain Injury
- Medical Information:
 - ICD 10 Primary, ICD 10 Medical Issues Secondary
- Residence/Services:
 - Care Setting, Pre-Admission Services
- Psychological:
 - Diagnosis (pre-injury, post-injury), Psych Hospitalizations
- Vocational/Educational:
 - Education level, Employment History
- Program Registration:
 - Assigned Program Type, Hours of Supervision

FABR Demographics Sheet - Interval



- Personal Information:
 - Marital Status, Funding
- Medical Information:
 - ICD 10 Primary, ICD 10 Medical Issues Secondary
- Psychological:
 - Diagnosis (post-injury), Psych Hospitalizations
- Program Registration:
 - Assigned Program Type, Hours of Supervision

FABR Demographics Sheet - Discharge



- Personal Information:
 - Marital Status
- Residence/Services:
 - Care Setting, Services at time of Discharge
- Medical Information:
 - ICD 10 Primary, ICD 10 Medical Issues Secondary
- Psychological:
 - Diagnosis (post-injury), Psych Hospitalizations
- Vocational/Educational:
 - Education level, Employment History
- Program Registration:
 - Assigned Program Type, Discharge Reason, Treatment Assessment, Hours of Supervision

FABR Demographics Sheet – Follow Up



- Personal Information:
 - Marital Status (at follow up)
- Injury Information:
 - Injury Date, Coma Length (hours, days), Previous Injury, Injury Type and Cause, Severity of Brain Injury
- Medical Information:
 - ICD 10 Primary, ICD 10 Medical Issues Secondary
- Residence/Services:
 - Care Setting, Services
- Psychological:
 - Diagnosis (post-injury), Psych Hospitalizations
- Vocational/Educational:
 - Education level, Employment History
- Treatment Hours:
 - Hours of Supervision, Individual Treatment Hours (allied health, alternative), Group Treatment Hours

FABR MPAI & SRS Rating Data



Mayo-Portland Ad	aptability Inventory-4	
Muriel D. Lezak, PhD, ABP	P & James F. Malec, PhD, ABPP	
Name: Clinic #	Date	
Person reporting (circle one): Single Professional Professional	Consensus Person with brain injury Significant other:	Name: Date:
Below each item, circle the number that best describes the level at v greatest level of problem that is appropriate. Problems that interfere should be considered not to interfere. Write comments about specific	e rarely with daily or valued activities, that is, less than 5% of the time	Rater: SUPERVISION RATING SCALE (SRS)
	blem; interferes vities 5-24% of Moderate problem; interferes with activities 25-75% of the time 3 Moderate problem; interferes with activities more than 75% of the time	Instructions: Circle the rating that is closest to the amount of supervision that the patient actually receives. "Supervision" means that someone is responsible for being with the patient. Rating Description
medication		Level 1: INDEPENDENT The patient lives alone or independently. Other persons can live with the patient, but they cannot take respons bility for supervision (for example, a child or elderly person).
Part A. Abilities 1. Mobility: Problems walking or moving; balance problems that interfere with moving about 0 1 2 3 4	Part B. Adiustment 13. Anxiety: Tense, nervous, fearful, phobias, nightmares, flashbacks of stressful events 0 1 2 3 4	The patient is unsupervised overnight. The patient lives with one or more persons who <i>could</i> be respons to le for supervision (for example, a spouse or roommate), but they are <i>all</i> sometimes absent overnight.
Use of hands: Impaired strength or coordination in one or both hands 0	14. Depression: Sad, blue, hopeless, poor appetite, poor sleep, worry, self-criticism 0 1 2 3 4	Level 2: OVERNIGHTSUPERVISION The patient is only supervised overnight. One or more supervising persons are always present overnightbut they are all sometimes absent for the rest of the day.
Vision: Problems seeing; double vision; eye, brain, or nerve injuries that interfere with seeing 0 1 2 3 4	15. Irritability, anger, aggression: Verbal or physical expressions of anger	Level 3: PART-TIME SUPERVISION
4. *Audition: Problems hearing; ringing in the ears	16. *Pain and headache: Verbal and nonverbal expressions of	-

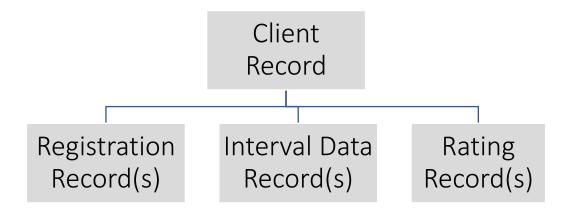
pain; activities limited by pain

6. Motor speech: Abnormal clearness or rate of speech; stuttering

17. Fatigue: Feeling tired; lack of energy; tiring easily

OutcomeInfo Database Architecture

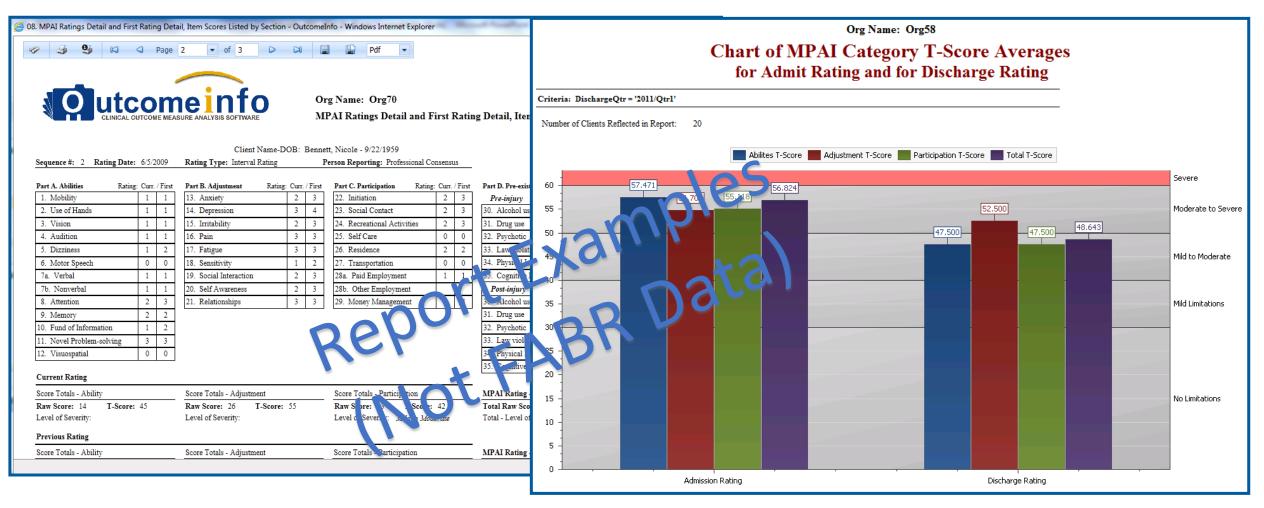




- Client Demographic Data
 - Personal Info, Injury Info, Medical Info, Residence, Services, Psych, Vocational and Educational Info
- Registration Data
 - Type of Program, Name of Program, Location
- Periodic Interval Data
 - Funding, Marital Status, Medical Information
- Outcome Rating Data
 - MPAI-4, SRS, DRS, ABS, etc.
 - Rating Date, Person Reporting, Rating Type (Admission, Interval, Discharge, Follow-up)

OutcomeInfo Reporting Examples Individual Client Level or Aggregated Analysis





OutcomeInfo Database Security



- Database Hosted on Microsoft Azure SQL Server
 - Azure Advanced Data Security to include Data Encryption
- SSL Web-based Application Hosted on Microsoft Azure VM
 - Integrated User Security, Multi-factor Authentication
 - Users Only Access Their Own Organization's Data
 - Collaborative Reports Only Reflect Aggregated Summarized Data
- Secured by Multiple Levels of Firewalls
- Routine Vulnerability Assessment Scanning and Analysis

FABR Data Submission, De-identification & Aggregation

















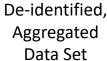














III. Research Process and Outcomes

James Malec, Ph.D., ABPP Cn, Rp
Chief Science Officer, FABR;
Senior Research Professor
Emeritus, PM&R, Indiana University
School of Medicine;
Emeritus Professor of Psychology,
Mayo Clinic



FABR Goals



- Partner with Inventive Software Solutions utilizing OutcomeInfo to create a high-quality database to conduct research on post acute brain rehabilitation services by pooling data received from FABR member organizations
 - Data are de-identified for the FABR member's patients/clients and the FABR member organization
- Conduct research to evaluate both the outcomes associated with models of treatment and the cost-effectiveness of such treatment
- Disseminate research findings for advocacy and policy development for the industry and for persons served

FABR Research Process



- Study Conceptualization and Approval
 - Study proposals developed by Research Committee from input of FABR members
 - Study approval by Governing Board prior to initiation
 - Internal research or program evaluation studies of individual organization data do not require Governing Board approval
- Study Design and Implementation
 - Chief Scientific Officer responsible for final design and implementation of each approved study
 - Data of persons served that are used in FABR studies are de-identified in accordance with the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule.
 - Data used in FABR studies are also de-identified for the organization, facility, and institution by which the person was served.

FABR Research Process



- Study Participation and Authorship
 - Governing Board members may participate in any FABR study
 - Other individuals in FABR organizations may participate on recommendation of FABR Governing Board member
 - Authorship follows International Committee of Medical Journal Editors (ICMJE) recommendations
- Dissemination
 - Paper submitted to peer-reviewed journal
 - PowerPoint presentation developed for national and local/regional presentations
 - Lay summary posted on FABR website

Research Agenda: Potential Studies

- 1. Introductory paper describing FABR
 - Program types & definitions
 - Demographic and injury related information describing persons served by various program types
- 2. Retrospective outcome analysis (pre-2020) to assess effectiveness of postacute BI rehab by program type
- 3. Comparison of pre-2020 outcomes to post-COVID outcomes
 - Exploration of potential causes of differential outcomes
 - Reduced therapy time
 - Telehealth vs. in person therapy
- 4. Analyses of factors contributing to differential outcomes
 - Time post-injury
 - Severity of disability
 - Intensity/duration of therapy by severity of disability
- 5. Cost-effectiveness of outcomes
 - Increased productive activity
 - Increased independence/reduced supervision needs



Intensive Rehabilitation Program	Description	Intensity Levels	
NEUROBEHAVIORAL RESIDENTIAL REHABILITATION	 For individuals who display complex behavioral challenges that may include verbal and physical aggression as well as property destruction. Highly structured and supervised setting Behavioral team of experts that include certified behavioral analysts, psychologists, and behavior technicians Specifically designed behavioral programming 	20+ hrs/week10-19	
NEUROREHABILITATION RESIDENTIAL	For individuals who require intensive rehabilitation services to support ongoing progress and recovery. • Participants have potential to make significant gains on rehabilitation goals • Home-like setting including community-based apartment living	hrs/week 3-9 hrs/week	
DAY TREATMENT **FABR Brain Injury Research & Analytics	 For individuals who reside in the community. Participants have potential to make significant gains on rehabilitation goals Individualized and group therapy services driven by the Care Plan Services occur in a clinic or facility-based environment Based on an interdisciplinary model Supervision by the program between treatment sessions and during down times, as needed 		

Intensive Rehabilitation Program	Description	Intensity Levels
OUTPATIENT NEURO- REHABILITATION	 For individuals who live in their own homes or apartments. Participants have potential to make significant gains on rehabilitation goals Supervision is usually not provided by the program between therapy sessions or during down time 	At least 6 hrs/week
HOME AND COMMUNITY NEURO-REHABILITATION	For individuals who can live safely in their own homes or apartments with or without supervision.	• 10+ hrs/week

Based on an interdisciplinary model



Participants have potential to make significant gains on rehabilitation goals At least 80% of services are provided in the individual's own home and community Services provided in individual treatment sessions

3-9

hrs/week

Supported Living Program	Description
NEUROBEHAVIORAL RESIDENTIAL SUPPORTED LIVING	 For individuals who have completed active rehabilitation but continue to have behavioral challenges that necessitate living in a highly structure setting. Highly specialized behavioral programming provided by a behavior analyst, neuropsychiatrist, and team of behavior technicians Limited clinical services, ongoing behavioral programming and periodic rehabilitation follow-up, as needed Progress expected to be slow and incremental
RESIDENTIAL SUPPORTED LIVING	 For individuals who have completed active rehabilitation but are unable to live on their own without external supervision and oversight provided up to 24 hours per day. Environment ensures safety, supervision and quality of life programming Limited clinical services, ongoing behavioral programming and periodic rehabilitation follow-up, as needed Group home or congregate living based Progress expected to be slow and incremental
COMMUNITY BASED SUPPORTED LIVING	For individuals who have completed active rehabilitation, no longer need ongoing clinical services and can live in their own home or apartment setting with support. • Participants may independently engage services like psychological counseling as might any

community-dwelling adult

Brain Injury Research & Analytics

FABR Discharges

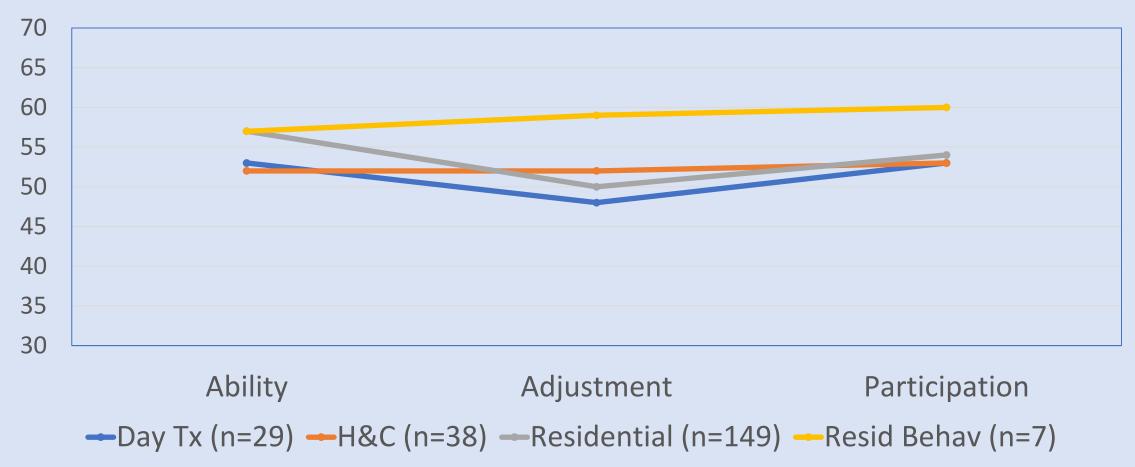
3/15/20-4/30/21

- Pandemic practice changes in place
- Admissions tended to favor residential programs
- SRS varied in expected directions among more intensive rehabilitation programs
- H&C participants tended to be longer post-injury

Program Type	Discharges	Median Admission Supervision Rating Scale	Mean Months Post-injury
Day Treatment	29 (12%)	8	5.4
Home & Community	38 (16%)	7	12.4
Outpatient	9 (4%)	2	>10 yrs
Behavioral Residential	7 (3%)	9	5.1
Residential Rehabilitation	149 (64%)	8	5.0
Supported Living	1 (<1%)		
Total	233 (100%)	8	



Mayo-Portland (MPAI-4) Index T-scores on Admission by 4 Program Types



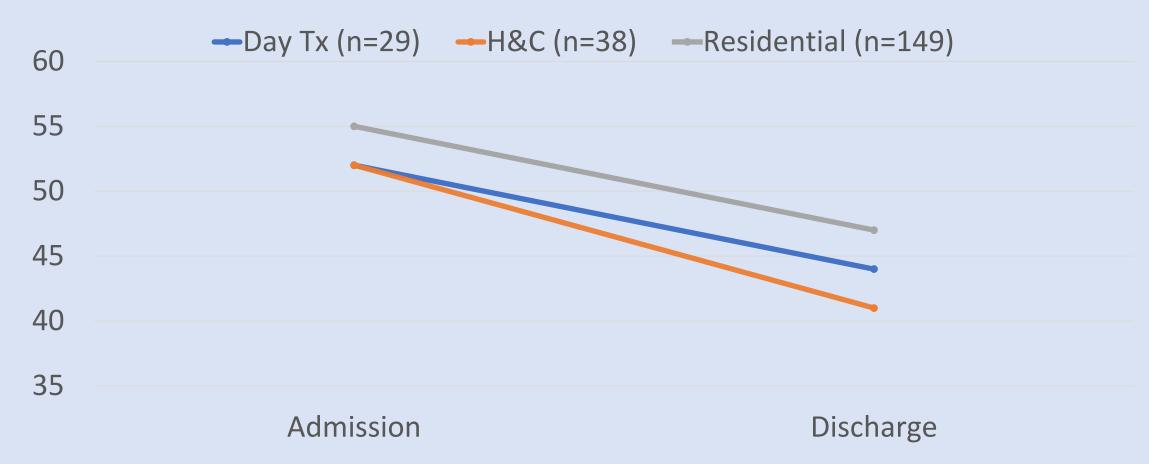


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MPAI-4 Total T-score Changes for 3 Program Types





Percent with Meaningful Change on SRS and MPAI-4 for 3 Program Types

Supervision Rating Scale

Program Type	Change ≥1	Change ≥2	Change ≥3
Day Tx	62%	48%	21%
H&C	72%	59%	34%
Residential Rehab	71%	50%	33%

MPAI-4 Minimal Clinically Important Difference (MCID) and Robust Clinically Important Difference (RCID)

Program Type	MCID= T score Change≥5	RCID= T score change≥9
Day Tx	62%	41%
H&C	76%	58%
Residential Rehab	65%	38%



Research Agenda: Potential Studies

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Archives of Physical Medicine and Rehabilitation

journal homepage: www.archives-pmr.org

Archives of Physical Medicine and Rehabilitation 2020; ■: ■ ■ - ■ ■



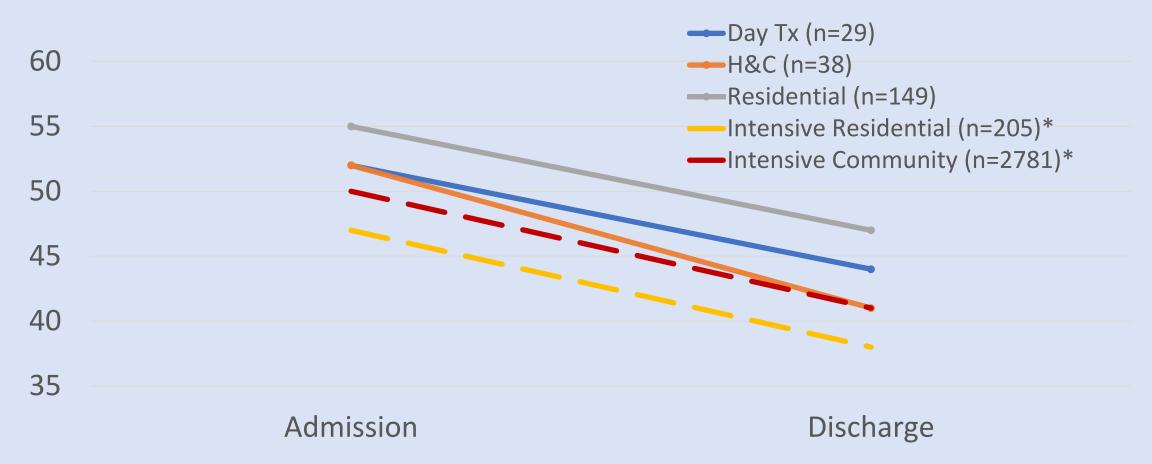
SPECIAL COMMUNICATION

Response to the COVID-19 Pandemic Among Posthospital Brain Injury Rehabilitation Providers

James F. Malec, PhD, ABPP/CN/RP, FACRM, a,b,c David B. Salisbury, PsyD, ABPP/CN,d David Anders, MS, CCC-SLP, CBIST, Leanne Dennis, CTRS, CCM, April R. Groff, PhD, Margaret Johnson, PhD, Mary Pat Murphy, MSN, CRRN, CBIST, Gregory T. Smith, PhD

From the ^aFoundation for the Advancement of Brain Rehabilitation, Philadelphia, Pennsylvania; ^bPhysical Medicine and Rehabilitation, Indiana University School of Medicine, Indianapolis, Indiana; ^cMayo Clinic, Rochester, Minnesota; ^dPate Rehabilitation, Dallas, Texas; ^eOn With Life, Ankeny, Iowa; ^fShepherd Center, Atlanta, Georgia; ^gLearning Services, Raleigh, North Carolina; ^hRehab Without Walls, San Jose, California; ⁱReMed, Paoli, Pennsylvania; and ^jProgressive Rehabilitation Associates, Portland, Oregon.

MPAI-4 Total T-score Changes for 3 Program Types Compared to Pre-Pandemic National OutcomeInfo Data





Percent with Meaningful Change on SRS and MPAI-4 for 3 Program Types & Prepandemic National OutcomeInfo Data

MPAI-4 Minimal
Clinically Important
Difference (MCID)

and

Robust Clinically Important Difference (RCID)

Program Type	MCID= T score Change≥5	RCID= T score change≥9
Day Tx	62%	41%
H&C	76%	58%
Residential Rehab	65%	38%
Intensive Rehabilitation (Residential & Community)*	72%	54%



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CAVEAT

- Results presented are intended to describe the potential of the developing FABR database.
- However, these results are based on preliminary data collected during the COVID19 pandemic which resulted in significant practice changes for all FABR member organizations.
- Consequently, they may under-represent future processes and outcomes for FABR organizations as the pandemic remits.



Looking Ahead

- Policies for admitting new member organizations will be developed by January 2022.
- Organizations may subscribe to the OutcomeInfo database at any time; data will not be used for FABR research without explicit permission.
- Policies for making data available to external researchers are also planned for development.









FABR Founding Members











