Changing Minds

About What's Possible in Behavioral Health

2023 Outcomes Report

DISCOVERY
Behavioral Health

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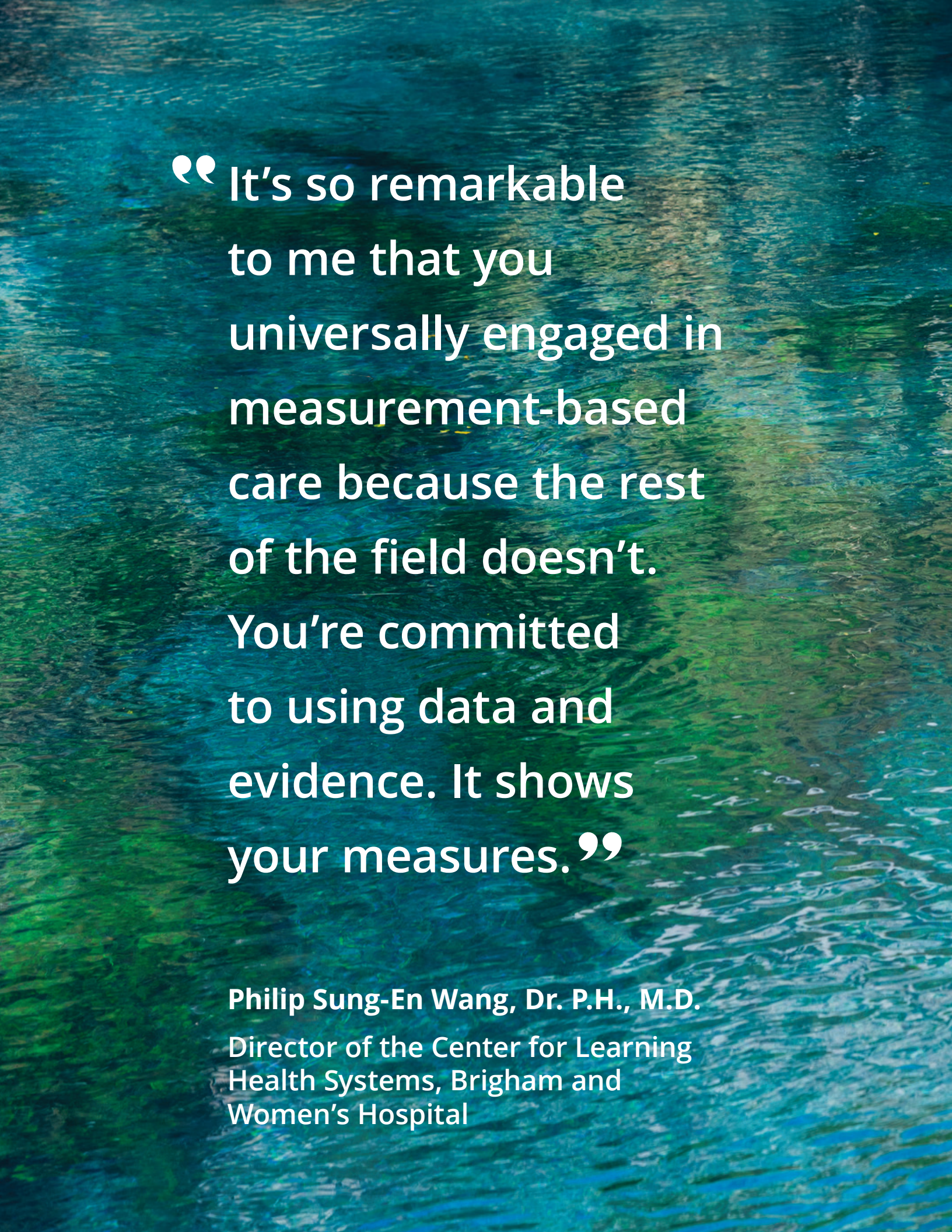

“It’s so remarkable to me that you universally engaged in measurement-based care because the rest of the field doesn’t. You’re committed to using data and evidence. It shows your measures.”

Philip Sung-En Wang, Dr. P.H., M.D.

Director of the Center for Learning Health Systems, Brigham and Women’s Hospital

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A Letter from the President

If you visit our home office in Irvine, California you will quickly notice a large green street sign bearing the name “One Healthcare Lane.” It represents a vision I have held for nearly two decades. During that time, much of the medical community regarded behavioral health as “less than” other healthcare disciplines. Less quantifiable. Less relevant. Those dismissive beliefs informed the care of patients struggling with depression, anxiety, or addiction: patients who had the added burden of being stigmatized not just by society, but by their own doctors; patients whose treatment programs were relegated to the darker, back corners of hospitals, far from the expansive wings dedicated to cardiology or oncology. But in March of 2020, everything would change.

The COVID-19 pandemic provided much needed illumination to the healthcare industry and to society. Suddenly it became evident that that we were all just one major event away from feeling helpless or hopeless. Telehealth companies and social media influencers rushed to the forefront, letting everyone know it was okay to not be okay. Telemedicine visits surged 766% over the previous year. Traditional behavioral health providers saw a surge in demand that far exceeded supply. Everyone began to realize at a deeply personal level that mental health is not just a catalyst for betting living; it is a requirement. They began to understand One Healthcare Lane.

We want everyone to understand the role that mental health plays in overall health. That is why we took the time to collect outcome data from more than 17,000 patients and have it verified by Brigham and Women’s Hospital, a teaching hospital of Harvard Medical School.

We wanted to confirm what we have known all along - that behavioral health does not belong in the dark corners of healthcare. It is in fact, the front door to overall health and longevity. When you see our results, you might just change your mind about what’s possible.

John Peloquin

John Peloquin, MBA, PhD
President & CEO, Discovery Behavioral Health

What Gets Measured Gets Managed

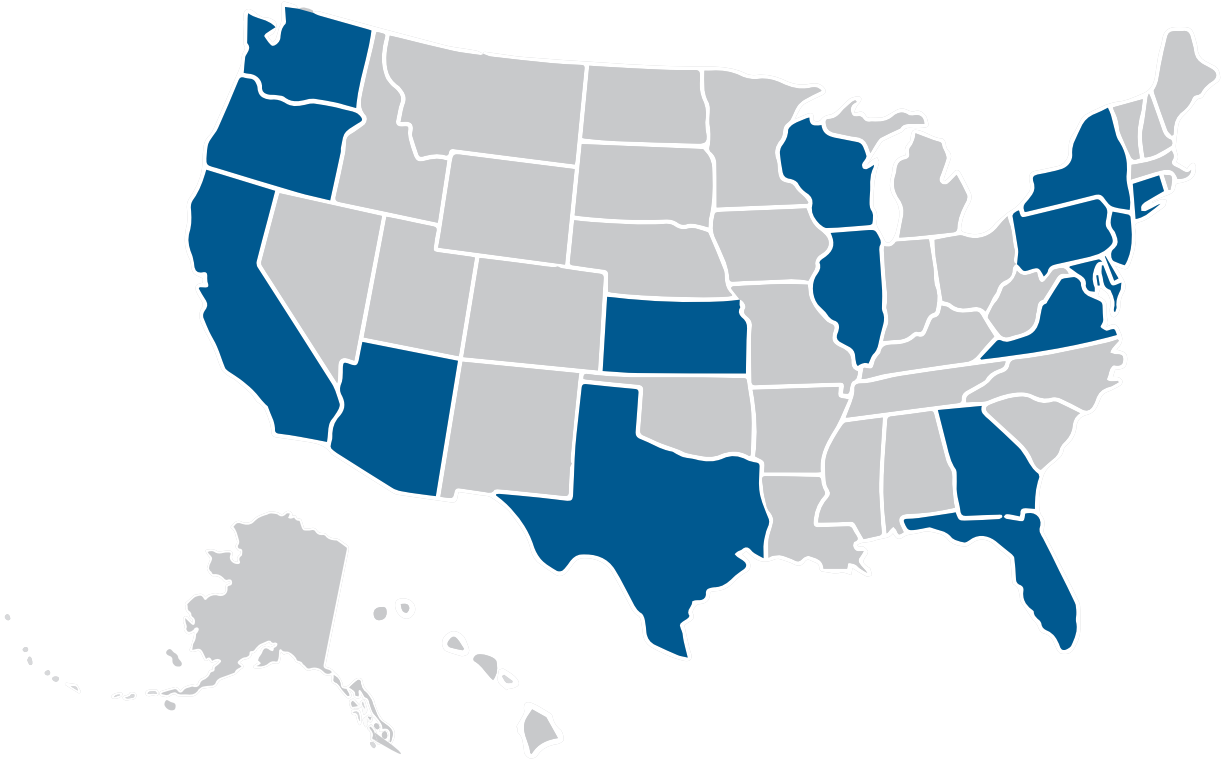
As an industry, behavioral health hasn't always been at the forefront of measurement-based care.*

61.5%
of clinicians never used standardized progress measures

13.9%
of clinicians used them at least monthly.

58%
of VA providers collected one measure for at least half of their patients.

Discovery Behavioral Health (DBH) Snapshot



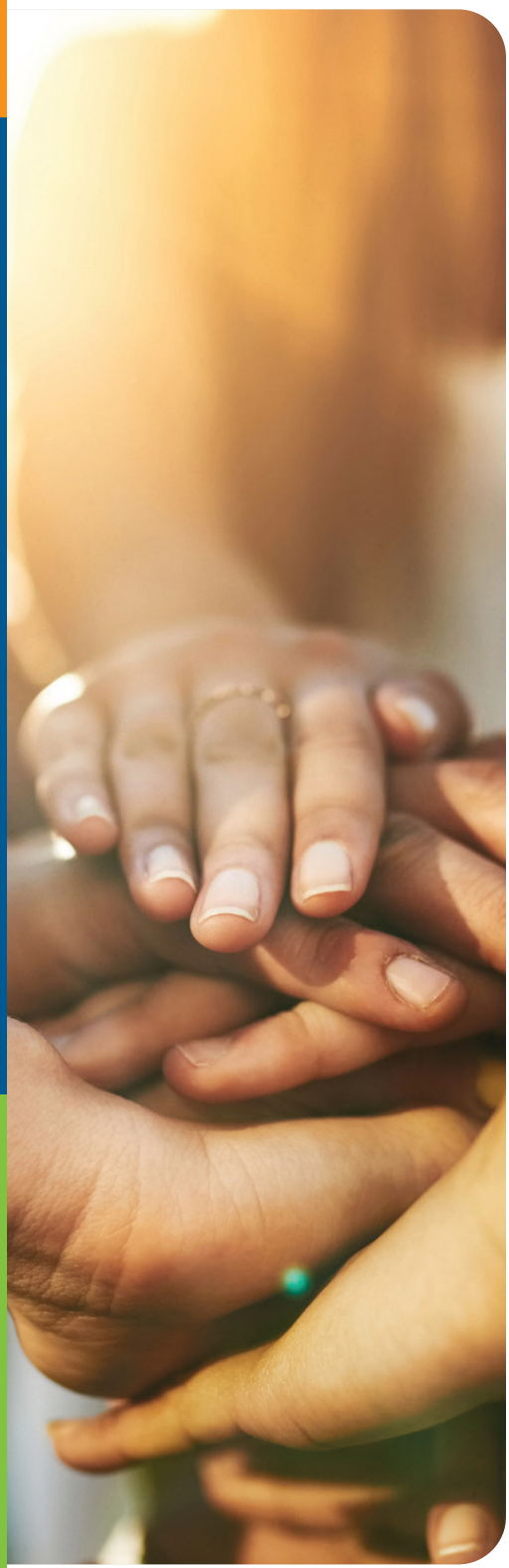
- National system of behavioral health treatment centers
- Continuum of outpatient treatment services
- Evidence-based treatment
- Measurement-based care
- Discovery365™ post discharge assessment platform
- PHQ-9 and RAS for all patients
- Service-specific patient-reported outcome measures (PROMs)

*Jensen-Doss A, Haimes EMB, Smith AM, et al: Monitoring treatment progress and providing feedback is viewed favorably but rarely used in practice. Adm Policy Ment Health 2018; 45:48–61.

*Oslin, D. W., Hoff, R., Mignogna, J., & Resnick, S. G. (2019). Provider attitudes and experience with measurement-based mental health care in the VA implementation project. Psychiatric Services, 70(2), 135–138.

Who Drops of Out Treatment?

To understand how to keep patients in treatment, we wanted to understand, who drops out of treatment.



1 out of 5 patients drop out of mental health treatment

> 70% of patients drop out after 1st or 2nd visit

Treatment dropout -> poorer outcomes

- Greater substance use relapse
- Lower rates of remission from depression

Disproportionately affects:

- Under-resourced
- Higher levels of disability

Predictors of treatment dropout

- Demographics
  - Female
  - Younger age
  - Member of a racially/ethnically minoritized group
  - Lower levels of education
  - Low income
  - Lack of health insurance that covers mental health care
- Diagnosis/Severity
  - Substance use disorder
  - Eating disorder
  - Personality disorder
  - OCD-related disorders
  - Higher symptom scores
  - More severe disorders - more reasons to drop out
- Predictors of treatment dropout
  - Psychosocial Beliefs:
    - Can handle problems on own
    - Mental health treatments are not effective
  - Low perceived need
  - Perceived improvement in mental health
  - Stigma
  - Negative experiences with providers
  - Income – financial and psychological barriers to treatment
  - Treatment-Related Factors

Related to retention:

> 1 modality
(e.g., psychotherapy and pharmacotherapy)

Pharmacotherapy

Manualized or time-limited treatment

Prior treatment

Related to dropout:

Side effects

Dissatisfied with service

Insufficient time with provider

Inexperienced providers (e.g., in training)

Overview of DBH Data

Inclusion criteria:

Received treatment and discharged from DBH 2021 – 2022
Eating disorder, mental health and substance use disorder treatment program
At least one treatment day
Completed PHQ-9 and Recovery Assessment Scale (RAS) on admission
Data Quality

Extremely high-quality data set

Includes over 17,000 patients with more than 22,000 unique treatment episodes
146 unique variables describing patient characteristics
High levels of completeness of variables
52% of variables were 99% complete
>90% of variables were >65% complete
Distribution of variables was consistent with expectations
No major outliers or evidence of significant data entry errors

Data Quality

Highly detailed documentation of all variables with data sufficient for complicated statistical analyses, peer-reviewed publications, and actionable practice insights

Preview of Findings

DBH care quality is significant

DBH patients' depression severity decreased by 43% on average from the time of admission to the time of discharge.

Improvement in mental health severity within DBH patients was notable in light of other treatment studies that we reviewed from the literature.

Mental health severity and recovery are strong predictors of treatment dropout

A 1-point increase in baseline PHQ-9 (i.e., worse depression severity) decreases the risk of dropout by about 2% on average.

A 1-point increase in baseline RAS (i.e., better recovery) increases the risk of dropout by 1%.

Patient Health Questionnaire (PHQ-9)

Scale Characteristics

Widely used screening test for depression
Sensitive to change in depression severity
Higher scores = More depression
9 items
Responses range from 0 - 3
- Not at all
- Several days
- More than half the days
- Nearly every day

Range of scores: 0 - 27

9 items

1. Little interest or pleasure in doing things
2. Feeling down, depressed, or hopeless
3. Trouble falling/staying asleep, sleeping to much
4. Feeling tired or having little energy
5. Poor appetite or overeating
6. Feeling bad about yourself, that you are failure, let yourself or family down
7. Trouble concentrating
8. Moving or speaking so slowly that others notice, or more fidgety or restless more than usual
9. Thoughts that you would be better off dead, or of hurting yourself

Recovery Assessment Scale (RAS)

Scale Characteristics

Widely used measure for mental health recovery
Sensitive to change over time
Higher scores = better function
41 Items
Responses range from 1 - 5
- Strongly disagree
- Disagree
- Not sure
- Agree
- Strongly agree

Range of scores: 41 - 205

Five-factor model

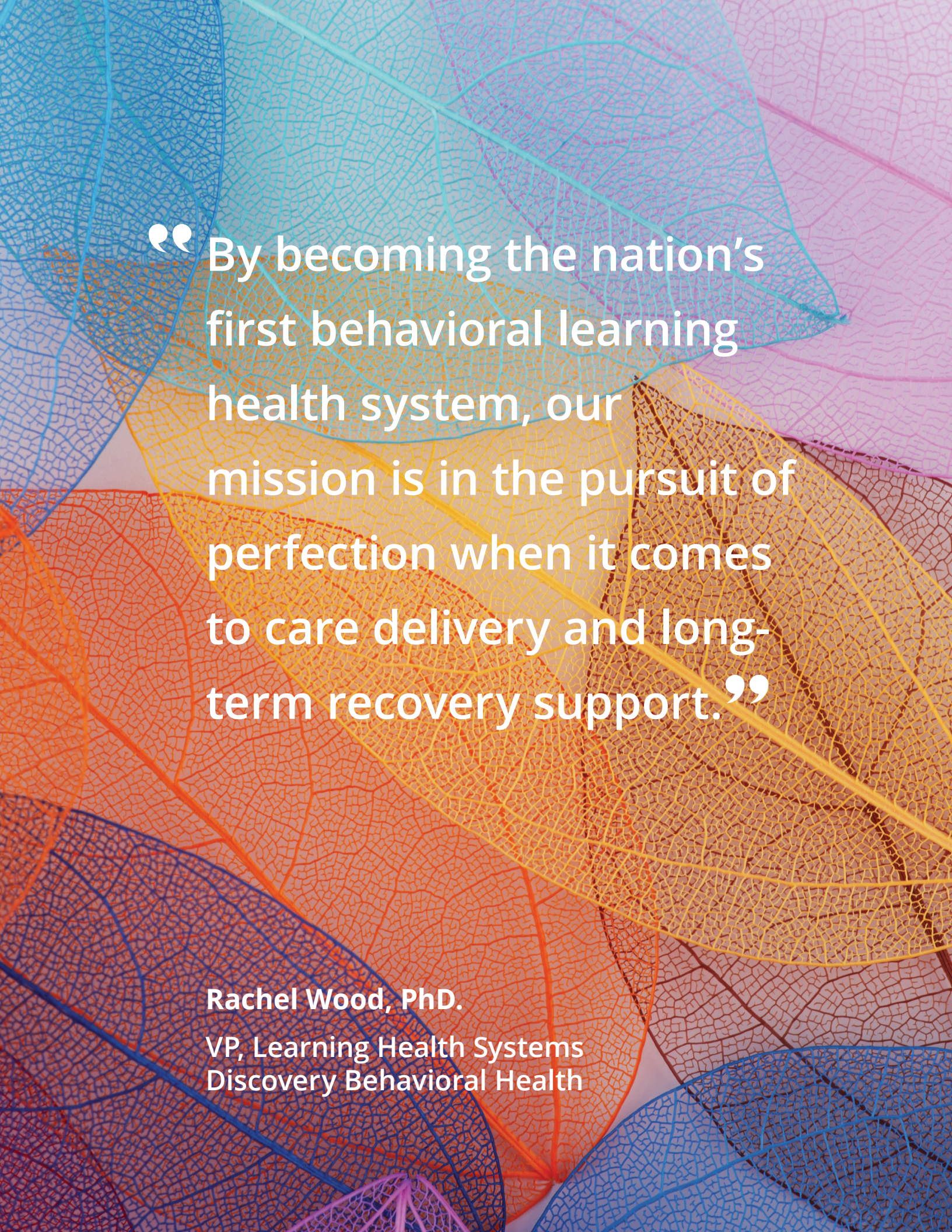
Reliance on others
I have people I can count on

Goal and success orientation
I have goals in life that I can reach

Willingness to ask for help
I ask for help when I need it

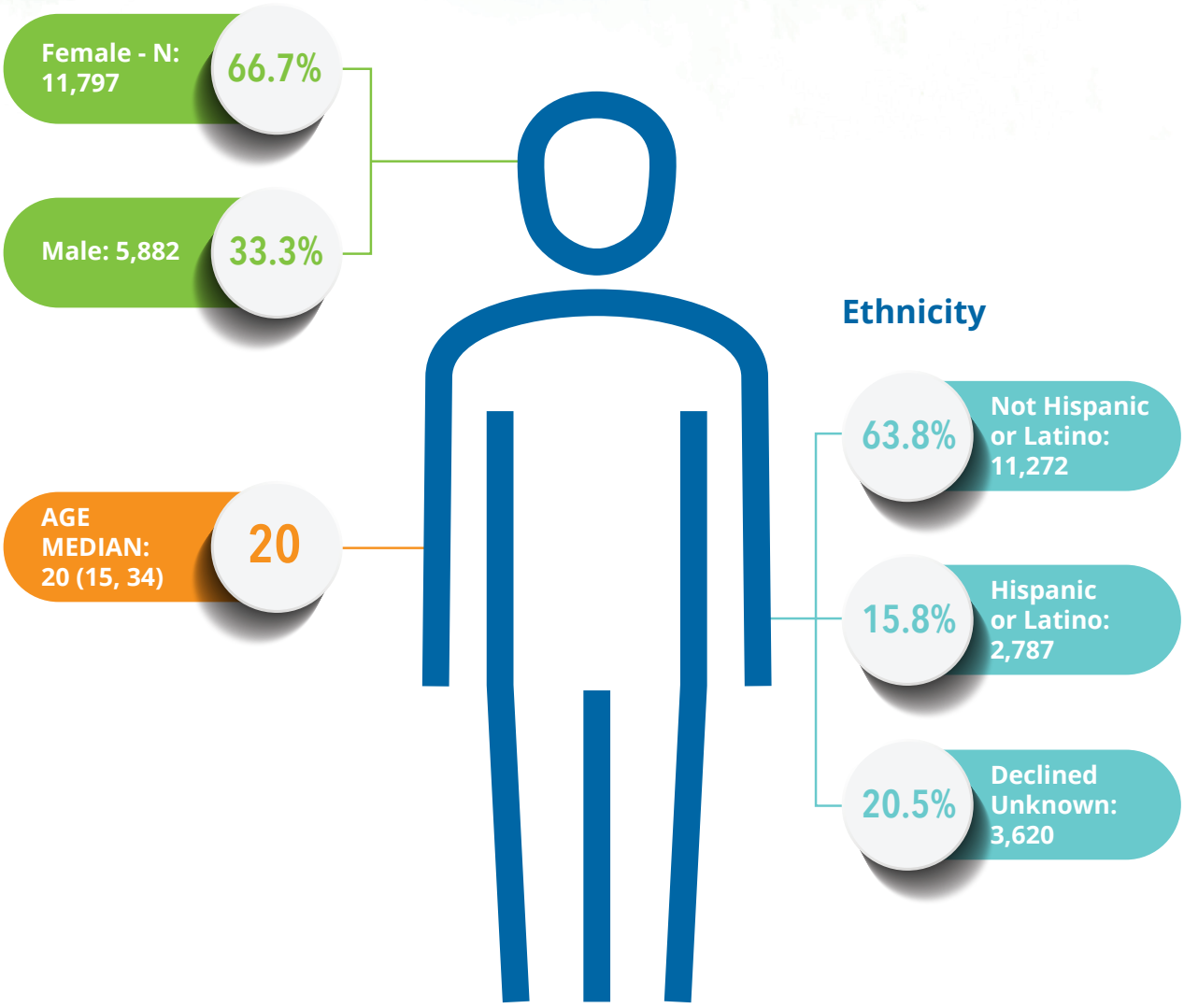
Personal confidence and hope
I am hopeful about my future

No longer dominated by symptoms
Coping with mental illness is no longer the main focus of my life


“By becoming the nation’s first behavioral learning health system, our mission is in the pursuit of perfection when it comes to care delivery and long-term recovery support.”
Rachel Wood, PhD.
VP, Learning Health Systems
Discovery Behavioral Health

Characteristics of Study Sample

Cohort N = 17,679



Race

0.7%
Native American/ Alaska Native: 119

5.2%
Black/African-American: 912

69.4%
White: 12,276

7.6%
Multi-racial: 1,340

3.7%
Asian: 651

0.4%
Hawaiian/Pacific Islander: 63

1.6%
Other: 278

11.5%
Declined/Unknown: 2,040

Primary Diagnosis at Initial Episode*

	N = 17,679
Depression	4,344 (24.6%)
Bipolar Disorder	617 (3.5%)
Anxiety Disorder	883 (5.0%)
PTSD	311 (1.8%)
Eating Disorder	4,986 (28.2%)
Alcohol use disorder	3,671 (20.8%)
Opioid use disorder	956 (5.4%)
Cocaine use disorder	215 (1.2%)
Other stimulant use disorder	470 (2.7%)
Cannabis use disorder	232 (1.3%)
Sedative-hypnotic use disorder	271 (1.5%)

Treatment Episodes

	N = 17,679
Depression	4,344 (24.6%)
Bipolar Disorder	617 (3.5%)
Anxiety Disorder	883 (5.0%)
PTSD	311 (1.8%)
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Individual Predictors of Treatment Drop-Out

	Hazard Ratio (95% CI)
Female	**0.73 (0.68, 0.78)**
Age Group	
Adolescent	
Adult	**1.57 (1.48, 1.68)**
Ethnicity	
Not Hispanic or Latino	
Hispanic or Latino	1.06 (0.98, 1.15)
Race	
Native American/Alaska Native	0.90 (0.62, 1.31)
Asian	**0.78 (0.66, 0.93)**
Black/African American	1.05 (0.92, 1.21)
Hawaiian/Pacific Islander	1.20 (0.77, 1.87)
White	
Other	**1.52 (1.22, 1.89)**
Multi-racial	0.96 (0.86, 1.08)

	HR (95% CI)
Baseline PHQ-9 Score	**0.98 (0.98, 0.98)**
Baseline RAS Score	**1.01 (1.006, 1.01)**

HR represents for every 1-unit increase in the baseline **PHQ-9** score, the risk of dropping out of treatment decreases by 2%

HR represents for every 1-unit increase in the baseline **RAS** score, the risk of dropping out of treatment increases by 1%

“I’m truly inspired by Discovery Behavioral Health’s investment and dedication to effecting change in an industry that has been stuck for decades. I take pride in partnering with an organization that places the patient at the heart of their initiatives, dedicated to creating meaningful impact.”

Dr. Brett Talbot, Ph.D.

Licensed Psychologist, CCO
Co-founder Videra Health

In summary, factors associated with treatment drop-out at DBH:

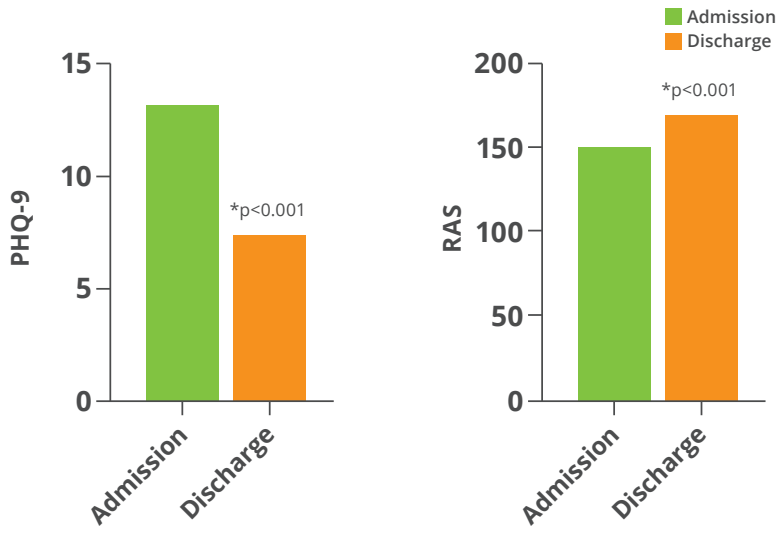
- Male sex
- Adult
- Asian race protective, other race increased drop out
- Bipolar disorder, most SUD
- Depression and anxiety disorders less likely to drop out
- Lower levels of depression severity (PHQ-9)
- Higher (better function) RAS scores

Completion of PHQ-9 and RAS at Discharge

	PHQ-9	RAS
Overall Treatment Episodes	18,486 (83.1%)	13,660 (61.4%)
Division		
Mental Health	5,903 (87.2%)	4,590 (67.8%)
Substance Use Disorder	6,842 (79.0%)	5,095 (58.8%)
Eating Disorder	5,741 (84.3%)	3,975 (58.4%)
Care Setting		
Outpatient	10,273 (84.4%)	5,536 (55.0%)
Residential	8,213 (81.6%)	1,107 (25.5%)
Discharge status		
Treatment Dropout	2,566 (59.2%)	1,107 (25.5%)
Completed Treatment	12,412 (95.3%)	10,588 (81.3%)
Other	3,508 (71.9%)	1,965 (40.3%)

Improvement in PHQ-9 and RAS

- Dramatic improvement in depression severity
- 43% improvement!
- Significant improvement in RAS scores



Improvements in PHQ-9 greater than reported in other studies

	Patient population	Intervention	(Average) time	N	Baseline Score	Mean change
DBH	DBH	Treatment at DBH	45 days	18,486	13.1	-5.68
Beck et al. (2014)	MDD patients from primary care/ behavioral health clinics	Internet-delivered MBCT	8 weeks	100	≤12	-1.98
Lindell et al. (2018)	Outpatient	Psychiatric care	11.1 weeks	117	13.9	-4.1
Härter et al. (2018)	Primary care units	Stepped and collaborative care models	3 months	569	15.3	-3.00

Beck, A., Dimidjian, S., Boggs, J., Felder, J., & Segal, Z. (2014). PS2-43: Internet delivered mindfulness-based cognitive therapy for reducing residual depressive symptoms: an open trial and quasi-experimental comparison to propensity matched controls. Clinical Medicine & Research, 12(1-2), 104-104.

Lindell, V. A., Stencel, N. L., Ives, R. C., Ward, K. M., Fluent, T., Choe, H. M., & Bostwick, J. R. (2018). A pilot evaluating clinical pharmacy services in an ambulatory psychiatry setting. Psychopharmacology Bulletin, 48(2), 18.

Härter, M., Watzke, B., Daubmann, A., Wegscheider, K., König, H. H., Brettschneider, C., ... & Steinmann, M. (2018). Guideline-based stepped and collaborative care for patients with depression in a cluster-randomised trial. Scientific Reports, 8(1), 9389.

Improvement in RAS greater than reported in other studies

	Patient population	Intervention	Duration	N	Baseline M	Mean change
DBH	DBH	Treatment at DBH	47 days	13,660	150.63	+18.03
Soloman et al. (2016)	SMI	Autovideography intervention	12 weeks	10	172.1	+8.9
Wasmuth et al. (2021)	Outpatient	Narrative-informed occupational therapy	6 weeks	7	76.85	+9.72
Schweitzer et al. (2017)	Patients with schizophrenia	Metacognitive narrative psychotherapy	42-88 sessions	8	159.63	+11.13

Solomon, P., DeCesaris, M., Petros, R., Linz, S. J., & Hanrahan, N. P. (2016). A pilot randomized control trial of autovideography intervention to enhance recovery for people with severe mental illness. Best Practices in Mental Health, 12(1), 1-13.

Schweitzer, R. D., Greben, M., & Bargenquast, R. (2017). Long-term outcomes of metacognitive narrative psychotherapy for people diagnosed with schizophrenia. Psychology and Psychotherapy: Theory, Research and Practice, 90(4), 668-685.

Wasmuth, S., Wilburn, V. G., Hamm, J. A., & Chase, A. (2021). Comparing Narrative-Informed occupational therapy in adult outpatient mental health to treatment as usual: a quasi-experimental feasibility study with preliminary treatment outcomes. Occupational therapy in mental health, 37(1), 56-71.

Future Directions

Change in PHQ9/RAS

- Predictors of improvement
- Top 3 PHQ-9 items with greatest improvement
- Top 5 RAS items with greatest improvement
- Relationship of change with LOS
- Subgroup and effect modification: gender, race/ethnicity, division, age-group, etc.
- Analyses within DBH Divisions
- Multivariable models

Treatment Dropout

- Fine-grained analysis of specific items on PHQ-9 and RAS that predict dropout
- Define treatment status as dropout, completion and other discharge types
- Non-primary diagnoses
- Effect of specific diagnosis data in divisions (e.g., eating disorders)
- Subgroups and effect modification

Future Direction and Long Term Goals

- Precise measurement of patient outcomes (e.g., CAT-MH and work productivity)
- Link DBH records to medical claims to assess the value of DBH care
- Create optimal care pathways by using dynamic treatment modeling
  - Measure the value and return on investment of DBH treatment
- Optimize the outcomes from the Discovery 365 platform

“The Discovery365 program is making groundbreaking leaps in the behavioral health industry. You are transforming patient recovery by infusing AI into the world of behavioral health.”

Loren Larsen

Co-founder/CEO, Videra Health

Discovery365™ Year in Review

by Rachel Wood, PhD
VP, Learning Health Systems
Discovery Behavioral Health

Discovery365 is our proprietary digital platform that gives patients an opportunity to check in with a live treatment team in the first year following discharge from a treatment program when risk for relapse is statistically high industrywide. Patients receive a secure text 48 hours after discharge giving them access to the platform. Engaging with Discovery365 gives the patient an opportunity to answer questions in a video-chat format. In addition to sending real time alerts to us if a patient needs assistance during that important first year, we can collect data that informs future programs. The questions on Discovery365 are heavily weighted in social determinants of health (SDoH) which have an 80% impact on patient outcomes. The five domains of SDoH are:

- Healthcare Access and Quality
- Education Access and Quality
- Social and Community Context
- Economic Stability
- Neighborhood and Built Environment

Discovery365 was launched in September of 2022. We knew from our in-treatment outcomes that our patients were improving at statistically significant rates as verified by our clinical research partners at Brigham and Women's Hospital. But the question we wanted answered through Discovery365 was, "Are patients maintaining the gains made during treatment?"

We will answer that question in detail in a comprehensive report from the team at Brigham, scheduled for release in Q2 2024. But with our initial review, the results look promising. Below are some initial post discharge findings and highlights.

4000 Real Time Alerts to Help, Guide and Prevent Relapse

Over the course of the past year, we have received and responded to over 4000 alerts triggered by patients and family members in need of help after discharge, giving us an opportunity to divert emergency room visits and readmissions to higher levels of care.

Diagnosis-Specific Trends

In the future we will have diagnosis specific trajectories with improved predictive analytics to improve our programming and ability to intervene when needed post discharge.

Substance Use Patients Initial Post Discharge Metrics

Time	Item	Result
1 week	I have attended at least one aftercare appointment	85%
1 month	Spirituality and/or a belief in a higher power play an important role in my recovery	94%
	I am attending 12 step meetings or recovery support groups	90%
	I have been abstinent from substances for the past 30 days	94%
3 months	I am attending healthcare appointments as needed (primary care physician, pediatrician, psychiatrist, etc)	96%
4 months	I feel I have sufficient emotional/moral (or spiritual/higher power) support to maintain my recovery	90%
6 months	I am hopeful about my future	97%
	I am taking medications as prescribed	94%
	My relationships have improved	96%
10 months	I am attending 12 step meetings or recovery support groups	89%

Mental Health Patients Post Discharge Metrics

Time	Item	Result
1 week	I have attended at least one aftercare appointment	70%
1 month	I have attended at least one appointment for behavioral healthcare	92%
4 months	Coping with my mental health is no longer the main focus of my life	58%
6 months	I am hopeful about my future	85%
	I am pursuing occupational or academic goals	83%
	I am taking medications as prescribed	100%
	My relationships have improved since discharge	90%
9 months	I am hopeful about my future	80%
	I have the skills necessary to manage my mental health	100%
	My symptoms interfere less and less with my life	56%

Eating Disorder Patients Post Discharge Metrics

Time	Item	Result
2 week	I am attending my aftercare appointments	81%
1 month	I have attended at least one behavioral health appointment since discharge	100%
2 months	I am taking my medications as prescribed	98%
	I have the skills necessary to manage my eating disorder	80%
6 months	Coping with my eating disorder is no longer the main focus of my life	65%
	I understand how to manage the symptoms of my eating disorder	80%
	My relationships have improved since discharge	71%
9 months	I have not binged in the past 30 days	100%
	I have not purged in the past 30 days	90%
	I have the skills necessary to manage my eating disorder	80%

"Having a major Harvard Medical School teaching affiliate both validate our data and praise its clinical significance is a first for us – and likely for our industry. We know that our patients are showing remarkable improvements during treatment. Now, with the ability to track outcomes one year post discharge and share our findings with the industry, the opportunity for advancement is limitless. This is just the beginning."

Matt Ruble, MD

Chief Medical Officer
Discovery Behavioral Health

What is a Learning Health System?

A Learning Health System (LHS) is one "in which science, informatics, incentives, and culture are aligned for continuous improvement and innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of the delivery experience. (Institute of Medicine, 2007). Discovery's continuous data collection during treatment and for one year post treatment is analyzed by Brigham and Women's Hospital. This ongoing loop of data collection, analysis and application will help us to systematically improve future programs for patients and alumni.

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