

Administration for Community Living

**Behavioral Health Guide:  
Considerations for Best  
Practices for Children, Youth,  
and Adults with TBI**

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# Section I: Purpose of the Guide and Overview of Behavioral Health and Traumatic Brain Injury

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## Background

The development of this resource is funded by the United States Department of Health and Human Services' Administration for Community Living (ACL), contract number HHSP233201500119I, for TBI TARC in partnership with the Human Services Research Institute and NASHIA.

## Purpose

Brain injury was once referred to as the silent epidemic. There has been a significant increase in awareness of brain injury in recent years as a result of sports-related concussions and brain injuries incurred in combat in the Iraq and Afghanistan conflicts. Even with this increased awareness, there remains a significant gap in knowledge about brain injury, its implications for behavioral health conditions (e.g., mental illness and substance use disorders) and considerations for treatment.<sup>1</sup> In addition, there are often state regulations in place that can inadvertently restrict access to state-funded behavioral health supports for individuals with brain injury. Given the significant prevalence of brain injury and co-occurring behavioral health conditions, there is a need for guidance to states about how to effectively support these individuals.

State government-led brain injury programs are in a unique position to affect policy, increase training and implement practice changes within the state behavioral health system to ensure improved outcomes for this population. This guide will provide states with tools for initiating or improving their partnerships within state mental health systems. This guide provides:

- An overview of the prevalence and systemic issues that add to the complexity of supporting individuals with brain injury and co-occurring behavioral health.

- A review of partners and strategies, including a review of the national landscape and state behavioral health structure.
- Insight into training approaches that states might implement.
- An overview of screening protocols and methods that behavioral health systems can implement.
- Strategies for modifying clinical interventions.
- Guidance for modifying pharmacological interventions that can be shared with behavioral health systems and prescribing psychiatrists.

## **Audience**

The intended audience for this guide includes directors and staff of state government brain injury programs and personnel who serve as grantees for the Traumatic Brain Injury (TBI) State Partnership Program. The purpose of the TBI State Partnership Program is *to create and strengthen person-centered, culturally competent systems of services and supports that maximize the independence and overall health and well-being of people with TBI across the lifespan and the people who support them.*<sup>2</sup> Many federal, state and local entities share the goals of the TBI State Partnership Program and have the capacity to serve as valuable partners. The ability to lead, engage and support effective partnerships and collaboration, including behavioral health treatment providers, is critical to the success of their effort.

The intent is to provide them with tools to effect change within their state behavioral health systems and ultimately to improve outcomes for individuals with brain injury and co-occurring behavioral health conditions.

## **Note on terminology**

Federal and state systems often have separate funding streams for supporting those with mental illness versus those with substance use issues. For the purpose of this guide (aside from when it is important to distinguish between the two) the term “behavioral health” is used and is meant to be inclusive of both mental illness and substance use.

## **Rationale for focus on behavioral health**

The dictionary definition of behavioral health is: “The healthcare system that deals with the diagnosis and treatment of mental health, substance abuse, and associated physical disorders. It consists of the integrated delivery of care by psychiatrists, primary care physicians, social workers, and other healthcare

professionals.”<sup>3</sup> This, as a result, involves serving people with TBI and underscores the need for state government brain injury programs to collaborate and partner with administrators and providers of behavioral health services.

## **Overview of Behavioral Health and TBI**

Each year in the United States, TBI results in approximately 2.8 million emergency department visits, hospitalizations or deaths.<sup>4</sup> Potentially hundreds of thousands more individuals sustain TBIs each year but either do not seek medical care or are treated in physicians’ offices, urgent care clinics or federal, military or Veterans Affairs hospitals, and therefore are not included in data sets used to form these estimates.<sup>5</sup> In addition, these data are specific to TBI and do not include estimates of individuals who sustained brain injury as a result of a “nontraumatic” mechanism such as anoxia, stroke, aneurysm, etc.

One-third of individuals with brain injury will experience mental health problems six months to one year post-injury.<sup>6</sup> People with brain injury of any severity have two to four times the risk of attempting or having a death by suicide.<sup>7</sup> Substance use is a risk factor for sustaining a brain injury. Between 23% and 51% of adolescents and adults sustaining a TBI were intoxicated when the injury occurred,<sup>8,9</sup> and approximately one-quarter of people hospitalized for TBI have a history of substance use disorders.<sup>10,11</sup>

TBI has been demonstrated to be a risk factor for adverse life experiences. For example, 25% to 85% of incarcerated individuals report a history of TBI,<sup>12</sup> and a history of brain injury in this population significantly increases the risk of assault and violence and decreases the efficacy of treatment for a mental health problem.<sup>13</sup> In addition, individuals who have experienced domestic abuse or assault are more likely to have sustained either a traumatic or nontraumatic brain injury, such as anoxia from strangulation.<sup>14</sup> Also, people experiencing homelessness are more at risk for having a history of TBI before becoming homeless, and being homeless increases the risk of injury.<sup>15</sup>

### **Systemic issues**

While the need for behavioral health support for individuals with brain injury is evident, there are several factors that lead to systemic issues and barriers relating to individuals with brain injury accessing and being successful in regard to behavioral health treatment and support. As will be discussed in section IV, it begins with recognizing the brain injury.



## ***1. Identifying the brain injury***

TBI is often an undiagnosed or misdiagnosed co-occurring condition in behavioral health. Those who do report a history of brain injury will also have longer and more severe histories of substance use and more co-occurring behavioral health issues. For this reason, as many as 75% of the people seeking services for concurrent mental health and substance use disorders are living with the effects of brain injury.<sup>16</sup> Because brain injury is often an invisible disability, it is easy to miss and to misunderstand. People with TBI seeking services for behavioral health conditions may experience subtle but significant changes in memory, attention, problem-solving, sensation, social behavior and self-regulation, making it difficult to remember appointments, understand expectations, follow through with tasks and participate in group settings. Trouble with recognizing social cues and observing social norms may make it difficult for the person with TBI to fit into and benefit from some types of support. As a result, they often leave treatment prematurely because they cannot keep up or become discouraged. It is easy to imagine how frustrating this can be for both the client and their care providers. Having the right tools to recognize and manage the impact of brain injury can make a big difference in outcomes for a significant number of people served in programs addressing substance use disorders.<sup>17</sup>

Section IV will provide recommendations for screening for brain injury within a behavioral health setting and strategies for gaining buy-in from the behavioral health setting to develop and implement a screening protocol.

## ***2. Medical paradigm***

Brain injury has been trapped in a medical paradigm, which makes sense, especially as an individual navigates medical, rehabilitation and post-acute rehabilitation following injury. However, as a person navigates the long-term and chronic consequences and continues to live the rest of their life with brain injury, this paradigm needs to shift to a community and behavioral health paradigm. Unfortunately, decades of viewing brain injury as a medical condition have led to two outcomes that leave states with a battle in terms of engaging their state behavioral health systems. First, behavioral health providers often feel they are not trained or equipped to treat brain injury because they view it as a medical condition. Second, funding streams associated with behavioral health are often not inclusive of brain injury, and therefore these systems are reluctant to treat brain injury. In fact, there may be policies in place that restrict access to behavioral health services for individuals with co-occurring brain injury. Because of this, it is critical that state

brain injury programs focus on demystifying brain injury for behavioral health professionals. With this goal in mind, a key message is to assure those in the behavioral health system that they are not being asked to treat the brain injury. They are being asked to treat the behavioral health condition within the context of the person's brain injury, shifting the thinking about treatment to compensating for the effects of brain injury to improve behavioral health outcomes.

Two steps are needed by state brain injury programs to effect change in the behavioral health system:

- **Step 1** is to review the system's policies to ensure the language is not exclusive of supporting individuals with brain injury. For example, prior to a full review of the Colorado practice standards used to guide eligibility for Medicaid-funded behavioral health services, countless individuals with brain injury were being turned away from services. The standards were written in a way that led to clinicians not serving individuals with co-occurring brain injury and behavioral health conditions. This was due to confusion: they could not provide treatment for brain injury since it is not a covered health diagnosis. After careful review, the language was changed to be made clear that they are not treating the brain injury, but they are obligated to treat individuals with brain injury that have a covered behavioral health diagnosis.
- **Step 2** is to develop and implement training protocols for the behavioral health workforce in each state, which addresses the third systemic issue identified.

### ***3. Lack of training for the behavioral health workforce***

Section III will provide recommendations and strategies for approaching training for the behavioral health workforce. There has historically been a lack of training on brain injury for all personnel associated with behavioral health, including front office and intake staff, frontline staff, clinicians and psychiatrists. Largely, this stems from a lack of recognition of the need for training. Once the need is recognized, the next obstacle is that behavioral health staff feel like brain injury is a medical condition and therefore out of their scope of practice. However, as indicated previously, brain injury can shift from a medical event into a community and behavioral health condition. State brain injury programs can be instrumental in demystifying brain injury. The key message for the behavioral health professionals is for them to understand that they are not being asked to treat the brain injury. Rather, it is suggested that

they treat the behavioral health condition in the context of the person's brain injury. Behavioral health professionals are trained to treat just that, behavioral health conditions. In spite of the significant prevalence of co-occurring TBI and behavioral health, behavioral health professionals are not trained on brain injury. In addition, brain injury is often not a focus of preservice training.

With effective policy, screening and workforce development and training in place, state brain injury programs can effectively partner with their behavioral health systems to improve outcomes for individuals with co-occurring brain injury and behavioral health conditions. This guide will provide states with the tools they need to accomplish this goal.

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# Section II: Partners and Strategies

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To effect change and develop infrastructure that effectively supports individuals with brain injury and co-occurring behavioral health issues, it is important to first understand the behavioral health landscape. This includes both national organizations and state behavioral health structures. It is equally important to understand best practices related to partnership development. The only way to successfully effect change across systems is to ensure that the proposed strategies are in line with the system's mission and are feasible to implement. This section will provide an overview of key national organizations and a description of the structure of state behavioral health systems. Finally, this section provides best practices for developing effective partnerships.

## Partners

Nationally, there are a few key organizations that provide guidance and resources aimed at helping states improve the lives of individuals with behavioral health conditions. Some of these organizations also have funding that states might consider applying for to assist with system change and partnership development efforts.

*Note: At both the federal and state levels, funding streams often separate mental health from substance use and addiction. Many national organizations focus on one or the other, and grant and funding opportunities are often separated. It is important to understand how your state is organized. This will be covered later in this section.*

A good place to start is the [National Association of State Mental Health Program Directors](#) (NASMHPD). NASMHPD is identified as “home to the only member organization representing state executives responsible for the public mental health service delivery system, serving millions of people annually in all 50 states, 6 territories and pacific jurisdictions, and the District of Columbia.”<sup>1</sup> NASMHPD provides resources that assist treatment providers in engaging in best practices. [NASHIA](#) has a long-standing partnership with NASMHPD, and they work collaboratively to ensure that NASMHPD's membership is aware of brain injury and the significant prevalence of co-occurring behavioral health issues. This helps to ensure that each state director of behavioral health has

brain injury on their radar. For example, in a 2018 publication entitled [\*Traumatic Brain Injury and Behavioral Health Treatment\*](#), NASMHPD provides recommendations for behavioral health professionals to advance the needs of persons with TBI. Recommendations include the following: 1) behavioral health professionals should screen for lifetime exposure to TBI; 2) treatment must accommodate neurobehavioral deficits due to TBI; 3) treatment must be holistic to address comorbid conditions; and 4) improvement gained by insight must be supplanted by other therapeutic supports.

The [National Association of State Alcohol and Drug Abuse Directors](#) (NASADAD) is a good place to start because it pertains to substance use and addictions. NASADAD's basic purpose is "to foster and support the development of effective alcohol and other drug abuse prevention and treatment programs throughout every State."<sup>2</sup>

The [Substance Abuse and Mental Health Services Administration's](#) (SAMHSA's) mission is "to reduce the impact of substance abuse and mental illness on America's communities" and ensure they are critical stakeholders in the network of providers of services to people with a TBI.<sup>3</sup> Notably, SAMHSA's updated August 2021 publication,<sup>4</sup> which provides information specific to a behavioral health provider's response to understanding and addressing the needs of persons with a TBI, works toward this mission. An additional product developed by SAMHSA grantees in partnership with NASHIA is the *Traumatic Brain Injury and Substance Use Disorder: Making the Connection* toolkit, published in November 2021.<sup>5</sup> SAMHSA also provides funding to states in the form of block grants. Brain injury program directors can benefit from understanding what funding is available and if there are ways that brain injury can be included in their priorities through the state behavioral health organization.

There are several other organizations that may assist in your systems change and partnership efforts, far too many to list. Here are a few key organizations to consider:

[National Alliance on Mental Illness](#) (NAMI) "is the nation's largest grassroots mental health organization dedicated to building better lives for the millions of Americans affected by mental illness" in the U.S.<sup>6</sup> Their collaboration with TBI State Partnership Program personnel involves support during March for brain injury awareness month and related state activities. NAMI offers easily accessible and updated state fact sheets with critical information on a host of mental health topics to educate the public about needs: [Fact Sheet Library](#) |



[NAMI: National Alliance on Mental Illness](#). This organization exists in all states and serves in an advocacy and educational role.

[Mental Health America](#) (MHA) is a large, community-based mental health organization with numerous locations in cities and towns across America. MHA also provides online information and support for mental health. MHA provides, among other things, mental health screenings, education about mental health and living well, nationwide advocacy and peer support programs.

[National Institute on Drug Abuse](#) (NIDA) is housed under the umbrella of the National Institutes of Health. NIDA publishes factual and reliable information about commonly abused drugs and offers information on effects of drugs on adult and adolescent brains.

Understanding the national landscape can be helpful in terms of gaining information and exploring potential funding. To effect change at the state level, the state office of behavioral health will be a critical partner. NASMHPD provides a directory of state behavioral health organizations that can be found at <https://www.nasmhpd.org/content/mental-health-links>. There is additional information on national associations and resources on this website as well.

NRI, “the only national organization working with state agencies, the Federal Government, and other entities to define, collect, and analyze data on public behavioral health systems,” assembled state profiles in the report “State Mental Health Agency Organization.”<sup>7</sup> This document provides an overview of how these agencies are organized, what their responsibilities are and how each state is organized. The document can be found at [https://www.nri-inc.org/media/na0heuv3/nri\\_2020\\_profiles\\_smha\\_organization\\_and\\_structure\\_in\\_state\\_government-november\\_2021.pdf](https://www.nri-inc.org/media/na0heuv3/nri_2020_profiles_smha_organization_and_structure_in_state_government-november_2021.pdf).

Since each state can be organized differently, it can be helpful to reach out to the SAMHSA regional administrator in your area. These administrators are knowledgeable about how your state is organized, what initiatives are occurring and who to contact to initiate a partnership within your state mental health system. To find out more about regional administrators and to obtain contact information, visit this link: <https://www.samhsa.gov/about-us/who-we-are/regional-offices>.

### ***1. Definition and background of partnerships***

A working definition of partnerships is: “a collaborative relationship between entities to work toward shared objectives through a mutually agreed division of



labor.”<sup>8</sup> A myriad of advantages to partnerships exists, including enhancing the capacity to better serve clients and the community, sharing best practices, collaborating on cross-referrals and increasing knowledge-based resources that improve effectiveness. Further, effective partnerships can improve organizational capacity, engage new audiences and build organizational networks. Noteworthy, however, are the challenges and pitfalls of partnerships and the necessity to engage in partnerships effectively.<sup>9</sup> The inclusion of partnership development as part of this guide is a necessary component to ensure successful and lasting systems change.

## ***2. Partnerships***

Effective partnerships occur in a collaborative environment, ensure access to information, incentivize workforce productivity, encourage the use of data for decision-making, ensure effective communications and are proactive in their ability to respond to needs.<sup>10</sup> Nine recommendations for effective partnerships are provided below, based on information from the authors, which includes the following sources: review of the literature,<sup>11,12</sup> review of sample TBI partner web pages and notice of award information by ACL, review of two sample job descriptions for grantees and the authors’ ongoing professional partnerships.

# Nine Principles and Strategies

## 1. Shared vision

A shared vision ensures a culture of people working together with an appropriate division of labor based on strengths to ensure success. Ensure the process is collaborative and sustainable.<sup>13</sup>



### Strategy

- Assess the vision of a potential partner agency by conducting a comprehensive review of content on their website and social media.
- Determine capacity to respond to emerging and ongoing needs. A document that analyzes key words in the mission, vision and goal statements of partners is a critical resource in understanding capacity.
- Acknowledge perceptions that competition exists in vision and service delivery systems and adjust accordingly.
- If the vision of the partner agency is tangential to the focus of the partnership effort or merely for the convenience of securing and maintaining grant-funded dollars, little advantage exists in that partnership. Of note is a focus on consumer-driven partnership that assists in addressing needs and commitment among federal funding agencies.

## 2. Mutual trust and respect

Mutual trust and respect are the glue that binds the relationship. This step requires a laser focus on relationship building with partners through social connections and advancing leadership skills, which must include honoring your commitment relative to deliverables.



### Strategy

- Acknowledge the success of your partner members both publicly and privately and provide rewards for expertise. Encourage partners to publicize their successes far and wide.
- Model respect in meetings by focusing on successes and solution-focused strategies and engaging the expertise of partners. This includes transparent access to information such as helpful web pages and public documents. Specifically, follow up after meetings with effective notes and tasks. Send gentle reminders if tasks are not completed.
- Acknowledge the work and expertise of your partners in public formats, including meetings. To the degree possible, reward advisory board members for their expertise with stipends and per diem for travel.

### 3. Shared purpose based on identified needs

The purpose of the partnerships must be defined and based on serving the holistic needs of persons with TBI across their lifespans so they can live as productively as possible.



#### Strategy

- Determine the most effective motivation for engaging in the partnership with providers of behavioral health services. Assess the current level of service integration that exists, including sharing assessment efforts with partner agencies to eliminate the perception that the “wheel is being reinvented” needlessly. This provides an opportunity to acknowledge the work of partner agencies and their voices in your documents and dissemination. A sample model is provided.<sup>14</sup>
- Customize your efforts based on the needs of your partnerships with the political realities of your organizational structures. Grantee employees are assigned to a host of agencies within their state structures,<sup>15</sup> and this structure can both enhance and limit capacity for partnerships.
- The same principles that apply to strengthen person-centered systems of care also apply to engaging in strength-centered partnerships. If the purpose of the partnerships is merely a response to a government mandate that requires a partnership and the commitment does not exist, it has little opportunity for success. Failure in partnership development often stems from the tendency for people to be siloed in their expertise. Engagement in behavioral health is a two-way street, with grantees working to address people with TBI, and vice versa.

## 4. Transparent communication

The role of the state government's lead agency on brain injury varies across states. However, at the core, these agencies are charged with developing infrastructures, programs and policies to improve access to services, supports and outcomes for individuals with brain injury. These roles require transparent communication and a focus on sharing information about the benefit of the partnership. The process and content with which staff and administrators communicate, both internally and externally, define the organization. Problems or perceived problems with communications are a source of frequent consternation in organizations.



### Strategy

- Provide professional, predictable and reliable communication to partners. Most importantly, be respectful of staff within each partner organization, even if their approach does not always align with yours.
- Avoid the use of acronyms with partners that do not work in your field daily. Do not assume common language exists because, as stated earlier, people become siloed in their professional fields. The use of non-stigmatizing and person-first language is critical in all written and oral communications. Samples of resources that underscore appropriate language are available from a host of sources. See the following examples from partner behavioral health agencies and the TBI network:
  1. The Centers for Disease Control and Prevention (CDC) host a national web page with critical information about TBI, including data, publications and reports, pediatric guidelines and health-provider resources to share with partners.<sup>16</sup>
  2. SAMHSA provides information and links to documents underscoring the use of language to address the stigma of substance use disorders and focus on advancing treatment and recovery.<sup>17</sup>

3. NAMI provides a guide to using non-stigmatizing language to discuss mental illness.<sup>18</sup>

Dissemination of resources by partner behavioral health agencies supports and advances partnership arrangements.

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## **5. Flexibility in partnership procedures and structures**

Adjusting to the realities of the environment of your partner agencies requires flexibility.



### **Strategy**

- A one-size-fits-all approach will not be effective and does not allow partners to honor the various strengths of the partner agency, so flexibility is necessary.
  - The size of the agency will depend upon its resources and capacity to share effort. Turnover in personnel impacts capacity. Being mindful of the cost of partnerships, including time for personnel in training and collaborative work, travel costs, etc., is critical and identified throughout the literature.
-

## 6. Anticipate challenges

The work of improving the lives of people with TBI is complicated and requires a myriad of complex systems to work collaboratively to address the holistic needs of clients.



### Strategy

- A strengths-based approach that focuses on the assets of the organization is advised.<sup>19</sup>
- Recognize that resolving challenges for a person with TBI in a complex clinical-delivery system is difficult but critical work. Technical assistance that provides a helpful response based on the complexities of the system and identified needs is paramount. It is not helpful, for example, to develop strategies that are only applicable in urban areas for providers in rural communities, or supports that are not culturally responsive.
- Engage in partnerships with an understanding and knowledge about multiple diagnoses and co-occurring behavioral health and TBI disorders.

## 7. Adherence to a code of conduct

Adhering to ethical guidelines of professional practice, which are often guided by professional licensing boards and the partner's professional code of conduct, can strengthen partnerships.<sup>20</sup>



### Strategy

- Understand partner members' background and professional licensure to ensure the use of their expertise and background, especially in assignments to work groups. Ensure appropriate acknowledgment of professional credentials and maintain an updated list of partner agencies. Again, acknowledge contributions of all who contributed.
- Ensure a clear understanding of the expectations surrounding behaviors. Consider the development of a partnership memorandum of understanding (MOU) to minimize ambiguity about roles and functions. Behaviors should focus on expectations and positive outcomes. The MOU can be reevaluated as needed, in the spirit of flexibility. The benefits must be mutual, with a focus on advancing strong outcomes for people with TBI.



## 8. Use of collaborative technology

Use technology effectively to advance the logistical needs of your partners.

The goal is for partner agencies to view you as a resource for strengthening their work, and in turn, they will assist you to strengthen your efforts. Find out what technology your partner uses and work with it — for example, learn the particular program a state mental health system uses for data collection work.



### Strategy

- Ensure access to appropriate software for cross-functional collaboration and partnerships, including knowledge-management systems. Again, if you host a web page, ensure that information is current and accessible. A host of program management software exists. The best software is a product that people will find valuable and use — see what your partner agencies are using to manage their efforts. Understand that some entities do not have a choice in the software they use.
- Adapt technology to expand training and technical assistance that advance research-based practices and ensure that information is approachable. Forwarding a host of links from web pages without an explanation of their value is not helpful.
- New products should be included on communications and web pages as resources. Maintain a spreadsheet of products being shared by partner organizations and disseminated in your national and state network. Use the federally funded training and technical assistance centers to market and share products effectively.

## 9. Culturally responsive practices

Promote partnership models that ensure culturally and linguistically competent care. Partnerships with entities that serve culturally diverse populations are essential. Understand the limitations of evidence-based practices on partner agencies, including the limitations of evidence-based practices in the engagement of racially and ethnically diverse populations. It is critical to expand the capacity to implement existing culturally appropriate interventions.<sup>21</sup> The voices of people who represent underserved populations are crucial elements in your assessment, planning and intervention.



### Strategy

- Have individuals from specific racial and ethnic groups adapt existing EBPs or develop their own interventions based on community-defined evidence.
- Ensure the inclusion of racially and ethnically diverse individuals in outcome studies and build the capacity of the behavioral health workforce to implement existing culturally appropriate interventions.

## Summary

In summary, the first step toward effecting change is understanding the system you hope to affect. Many ingredients go into creating effective partnerships, and the nine outlined above are a sample based on the literature and the authors' experiences. Partnerships require time and due diligence in maintaining and supporting relationships. It is critical to praise accomplishments publicly and address concerns privately and maintain a focus on the objectives and the needs of the population you serve. When services are not effective, people suffer needlessly. Do not grandstand with partners, do your share of the work, be honest and communicate professionally.

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# Section III: Training Approaches

Maria Crowley, MA, CRC, TBI TARC and NASHIA

## Why Is Training Important?

Training is a necessary component to ensuring that behavioral health providers at all levels of service are equipped for working with individuals with TBI. Everyone within a state mental health system and related community providers needs information about brain injury basics in order to best work with individuals with TBI. However, everyone within a system does not have to be an expert in TBI. For example, physicians and nurses might find it useful to have training on current medication recommendations, while psychiatrists, psychologists and other counseling staff are concerned with various therapeutic interventions and their efficacy. Staff across the system need to know what to do for crisis intervention, harm reduction and overall safety. Many behavioral health professionals *will* need some level of training to better understand brain injury and best practices regarding treatment interventions. The goal is to equip providers with necessary knowledge to identify TBI and interventions that work best in their particular setting and where to find TBI resources in their community for additional expertise.

It is equally important for behavioral health providers to know that they may *already* be working with individuals with TBI but are unaware of it. This includes those individuals who:

- Do not yet know they have a TBI.
- Do know but are unaware of the extent of the challenges they are experiencing related to TBI, how it interacts with their behavior or even how to disclose it.
- Do know but have not disclosed it due to concerns about becoming ineligible for services.

Knowing that individuals seeking services have a TBI and how best to provide services and how to modify existing modalities will result in better outcomes for individuals with TBI (see Section V: Modifying Clinical Interventions for TBI).

The provision of training is often a start to establishing a good partnership with a state mental health system. Training can increase awareness of issues and

highlight needs for additional support. Instead of presenting challenges to a new mental health partner or provider, training can be a way for a state TBI program to open the door, introducing related issues and revealing the importance of collaboration and additional specialized resources. Many state TBI programs already provide general training to community partners. One option is to incorporate practices related to behavioral health into existing training on TBI. If possible, imbed TBI training into existing mental health system training for new staff, as state TBI programs currently do for new TBI staff and providers. Approaches could include:

- In-person training with TBI staff trainers or subject-matter experts.
- Archived virtual training through a link with TBI staff trainers or subject-matter experts.
- Core competencies for new staff — these competencies may already exist within your system or have been drafted by other state TBI programs. One example is the Opioids and Mental Health Competencies, created by several ACL TBI State Partnership Grant Program grantees.
- Continuing education for existing staff — as new practices or trends develop, continuing education can be provided to staff that have already been trained in basic approaches by your system.

Staff turnover is a significant factor in many systems, and behavioral health is no different. Providing information that can be accessed later is an effective alternative to repeating in-person education. Also, it is important to note that it is more effective when providing training to master's- or doctorate-level staff to utilize similar practitioners for training. Clinicians want to learn from peers.

Lastly, just as interventions vary based on age, keep in mind that training will vary as well, based on whether information encompasses children and youth or adult populations.

## **Which Training Components Should Be Included?**

It might be useful to think of training components in tiers, starting with the most basic information and working toward more complex challenges. Each tier leads to the next. Basic training applies to all behavioral health staff and can be repeated as needed. Intermediate training applies to providers in direct

contact with individuals receiving services. Trainers for both basic and intermediate levels should be staff and providers who are well-practiced in brain injury causes, sequelae and community resources. Advanced training applies only to the clinical staff engaged in therapeutic interventions, and trainers should be clinicians who are well-practiced in therapeutic interventions.

## **Basic**

Basic training prepares providers to have an overall awareness and knowledge of how TBI impacts children, youth and adults, and it supplies basic supports and strategies to providers through tutorials, either in-person or virtual. Some topics covered in basic training include:

- Definitions of brain injury.
- Mechanisms of brain injury.
- Severity of brain injury.
- Prevalence of brain injury.
- Prevalence of brain injury and co-occurring behavioral health issues, including mental health, suicide risk and prevention, and opioid and substance use disorders.
- Brain development.
- Associated challenges of brain injury.
- Simple compensatory strategies and accommodations.
- Community TBI resources and links.
- National TBI resources and links.

## **Intermediate**

Intermediate training prepares providers with additional knowledge of screening methods and treatment strategies for children, youth and adults through tutorial and interactive sessions, either in-person or virtual. Some topics covered in intermediate training include:

- Screening-tools needs, overview and practice.



- Identification of challenges and application of compensatory-strategies case studies and practice.
- Introduction to effective intervention modalities.
- Detailed review of TBI community-based resources and information.
- Referral protocols to community TBI providers.
- Systemic safety strategies.

## Advanced

Advanced training prepares clinical providers with tools for treatment within existing mental health settings by clinical subject-matter experts who are well versed in TBI and mental health challenges for children, youth and adults through in-person tutorials and interactive sessions. Some topics covered in advanced training include:

- In-depth review of behavioral and addiction treatment approaches and intervention.
- Medication management and review.
- Treatment modeling, supervision and shadowing.
- Systemic crisis intervention and harm reduction strategies.

## Where Can I Find Existing Materials and Resources?

There are several state TBI programs currently providing training to state mental health systems. It is important, however, to customize data and resources for your own state when providing training. Some national and state resources that will be useful are listed here:

- Substance Use/Brain Injury Bridging Project. (2021). *Client workbook: Substance use and brain injury* (2nd ed.)  
[https://static1.squarespace.com/static/5eb2bae2bb8af12ca7ab9f12/t/61c216a89268ca613d4bd917/1640109740567/SUBI+2+FINAL+508+accessible+12\\_16\\_21.pdf](https://static1.squarespace.com/static/5eb2bae2bb8af12ca7ab9f12/t/61c216a89268ca613d4bd917/1640109740567/SUBI+2+FINAL+508+accessible+12_16_21.pdf)

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- Improving MI Practices. (2022). *Behavioral health professionals and BDI*. <https://www.improvingmipractices.org/focus-areas/courses/brain-development-injury>.
- Association for Behavioral and Cognitive Therapies. (2022). *Adult traumatic brain injury for mental health professionals*. <https://www.abct.org/fact-sheets/adult-traumatic-brain-injury-for-mental-health-professionals/>.

## Where Can I Find Trainers and Existing Training?

The level of training should guide the person providing the training. There are a number of TBI basics available to share with behavioral health providers, both virtual training webinars and supporting written resources. A few of those are included in the list above

For advanced training providers, the section on therapeutic approaches might be useful. Contacting TBI TARC for subject-matter experts in this area, who may be specific to children, youth or adults, is also a useful option.

## Summary

Training related to TBI is critical for everyone working in behavioral health settings. With the right information delivered at the right time, staff can be educated about some of the key components and needs related to this unique population.

# Section IV: Screening for Lifetime History of TBI

John D. Corrigan, PhD; ABPP; professor, Department of Physical Medicine and Rehabilitation; and director, Ohio Valley Center for Brain Injury Prevention and Rehabilitation, the Ohio State University

Screening for lifetime history of brain injury is a critical component to ensuring that individuals with brain injury and co-occurring behavioral health conditions receive appropriate psychological and psychiatric support. State brain injury programs are positioned to partner with their state behavioral health agencies to ensure screening for brain injury is an integral aspect of their work. This section provides states with background on why screening is important and the rationale for gaining buy-in from state behavioral health agencies to implement brain injury screening protocols.

Research on TBI is dominated by studies in which the injury was determined at the time medical attention was received. As such, descriptions of the injuries reflect the extent of altered consciousness as observed at time of injury (e.g., behavior observed on the sideline) or documented by professionals who treated the acute injury (e.g., the first Glasgow Coma Scale score in the emergency department). Studies from later in recovery refer to the earlier occurrence (e.g., six months post-moderate or post-severe TBI). Even epidemiological data is dominated by reports of incident cases, commonly identified by the diagnostic code given at the time of treatment. When the intent is to identify TBI in nonmedical settings (e.g., people in domestic violence shelters, applicants for long-term services and supports, or new clients in behavioral health programs), the traditional ways of characterizing TBI as a single index injury are no longer as useful.

## Why Screen for TBI?

It is necessary to understand a person's entire history of exposure to TBI so that knowledge of associated effects on affect, cognition and behavior can be incorporated into treatment planning and delivery. Being unaware of neurological sources of impairment can undermine the effectiveness of whatever treatment approach is being employed. The methods required to screen for a lifetime history of TBI are very different from those used to determine whether an injury just occurred.

## **Lifetime history of TBI is unique**

Why not just collect information about past TBIs from previous medical records? This is a logical but impractical approach, as it would require acquiring medical records from a person's entire lifetime, then extracting the TBI diagnoses. Perhaps at some time in the future there will be access to a lifetime of medical records, but for now, it is very unlikely that all of a person's prior injuries could be located. The ability to obtain a lifetime's worth of medical records from physicians' offices, emergency departments or hospitals is a daunting task even without adding those injuries attended to only by a school nurse, athletic trainer or emergency medical technician in the field. The medical-record approach is further limited by the suspected, significant proportion of TBIs that receive no medical attention (which has been estimated to range from 30% to 60% of a person's lifetime injuries<sup>1, 2, 3, 4</sup>) as well as those (usually mild) TBIs that are missed in the emergency department (estimated in one study to be 50% of all cases<sup>5</sup>).

Why not use advanced medical technologies to detect past TBIs?

Unfortunately, as of this writing, there is no biomarker for past TBIs. Imaging techniques and neuropsychological assessments can be used to detect acute TBI of sufficient severity or chronic TBI of even greater severity, but none of these techniques are sensitive to all TBIs, especially not all TBIs that may have occurred in the remote past. These assessment techniques have what is called "specificity" (an abnormal finding is highly likely to be a true case) but lack "sensitivity" (a normal finding does not mean that no TBI ever occurred). Very mild (transient confusion without loss of consciousness) or very old (a TBI experienced in childhood) injuries are the most likely to be missed. Further, despite exciting work being conducted using biochemical markers, eye movement and speech patterns, there is still no definitive biomarker of TBIs that did not occur recently. Once again, to establish prevalence of TBI in a population or compare those members of a group with and without histories of TBI requires different approaches to identification than research on incidence or studies of samples collected from treatment settings.

## **Retrospective self-report of lifetime exposure**

The gold standard for determining lifetime history of TBI is retrospective self-report as determined via a structured approach. To be clear, not all retrospective self-reporting is equally valid. One or two questions in a self-administered scale or structured telephone survey will miss all but the most recent or most severe TBIs. In public health research, the tendency to forget past, minor injuries is called "telescoping."<sup>6,7</sup> Diamond and colleagues reported that a one-item, self-administered screener used during admission to

prison detected only 19% of the TBIs identified via structured interview.<sup>8</sup> Self-report also varies by the extent to which the respondent must self-diagnose whether the injury occurred. Asking people if they have ever had a “concussion” or “traumatic brain injury” requires *accurate* knowledge on the part of the respondent about what these conditions are.

There is no question that retrospective self-report has its weaknesses; however, a structured interview conducted by an informed professional or a systematic method of presenting questions in a self-administered screening is, for now, the gold standard for determining lifetime history of TBI. Research over the past 15 years has brought scientific rigor to this task and provided evidence of reliability and validity for results that had previously been accepted on face value alone. TBI researchers have become aware of the importance of stimulating memory for remote injuries and how to ask about neurological symptoms that define a TBI rather than expecting a person to self-diagnose. This work has also afforded insight into the limits of retrospective self-report that can arise from unawareness of past injuries, poor recall or stigma. Methods have been developed to capture episodes of multiple mild TBIs for which individual injuries are indistinguishable by the respondent (e.g., those arising from years of football or resulting from intimate-partner violence).

Retrospective self-report typically prompts respondents to recall injury events, though the type and structure of prompting vary widely. Some methods limit their scope to a subset of TBIs (e.g., those that required medical care or those resulting in loss of consciousness). Methods also vary by the extent to which signs and symptoms characteristic of TBI are used to establish a positive case. When they occur immediately upon experiencing an external force affecting the head, signs are considered direct evidence of altered consciousness (e.g., being dazed or confused, having a gap in memory, being knocked unconscious or experiencing coma). Symptoms are conditions that often result from TBI (e.g., seizure, headache, dizziness, sensitivity to light or sound, poor concentration) but can also occur for other reasons (e.g., trauma, cervical strain, metabolic changes).<sup>9</sup> Generally, signs are more reliable than symptoms for drawing conclusions from self-report.

Retrospective self-report techniques differ in the way elicited information is used. Many techniques result in a dichotomous, “yes or no” indication of whether a TBI occurred (e.g., during one’s lifetime or during deployment). Some techniques elicit other summary indices, like the worst TBI experienced, age at first TBI or number of TBIs with loss of consciousness. Our work on the Ohio State University TBI Identification Method (OSU TBI-ID) has suggested that reliability of different indicators can vary widely. For instance, the worse

the TBI, the better the reliability; the age at injury can vary by several years upon retest; and the number of TBIs without loss of consciousness is highly unreliable.<sup>10,11</sup> As described above, population surveys of all types of injuries concur that the less severe the injury and the more remote in time, the more likely recall is unreliable.<sup>12,13</sup>

### ***1. Validity of retrospective self-reports***

As state brain injury programs work with their behavioral health partners to develop screening protocols, it is important to advocate for the use of valid and reliable screening tools. The approach to validating a screening technique can vary. Ideally, retrospective self-report would correspond with TBIs documented at the time of their occurrence. Such studies are difficult to conduct because comprehensive datasets with which to compare self-report are rare.

As discussed above, these datasets may be limited to medically attended TBIs. A study of prisoners' retrospective self-report identified consistent shortcomings: 1) events that did not receive medical attention cannot be verified; 2) respondents are inconsistent in the recall of the exact year or age at the time of injury; and 3) medical records may confirm that an injury occurred, but a TBI may not have been documented.<sup>14</sup> Thus, this approach to validation often finds inaccurate reporting of lifetime TBIs. The extent of inaccuracy is reduced significantly when liberal allowances are made for the year or age at injury (e.g., plus or minus three years). Furthermore, documented injuries that did not include TBI may not be an inaccurate self-report due to the above-mentioned problems with under-identification of TBIs in emergency departments and hospital records.<sup>15</sup> When eliciting lifetime history of TBI, it is suspected that TBIs that occurred during early childhood may be underreported because the respondent was too young to be aware that an injury occurred. Some injury events are passed down via family lore rather than a firsthand memory, which can still be included in retrospective self-report measures.

While validation via testing of the verity of recall is the most straightforward approach, it is not the only approach. Validation of the OSU TBI-ID utilized the extent to which summary indices of lifetime history (e.g., most severe TBI reported or age at first TBI with loss of consciousness) contributed to the prediction of current cognitive abilities and neurobehavioral problems.<sup>16,17</sup> A predictive validity approach is appropriate when the primary purpose of the screening is to determine the likelihood that prior exposure to TBI is affecting current cognitive abilities and/or emotional functioning. This use of



retrospective self-report also necessitates having indices from screening that are more discriminating than a simple “yes or no,” as our studies support the clinical principle that not all TBIs have permanent effects.

Aside from criterion-related validity, construct validity may be supported by studies that survey clinical populations (e.g., prisoners, participants in substance use disorder treatment, people who are homeless) and find greater morbidity in the subpopulation that has a history of TBI. While most studies do find that a history of TBI exacerbates comorbidities or is associated with greater psychosocial complexity, this directionality is not universal. For instance, two studies of TBI history prior to a subsequent TBI found that while patients with a positive history had more psychiatric comorbidity, their functional status resulting from the new TBI was not as impaired as patients without a history.<sup>18,19</sup> While one study was of patients entering rehabilitation and the other of patients identified in the emergency department, both articles speculated that psychosocial complexity contributed to the decision to provide more intensive medical services.

One other source of construct validity is the observation of changes in brain structure or function that corresponds with results of a screening test. If people who self-report a history of TBI are more likely to have a structural abnormality of the brain than people who do not self-report such a history, then this observation is consistent with the construct (i.e., structural abnormalities do result from TBI). The more consistent a structural abnormality is with the known mechanism of how a brain is injured, the more construct validity is supported. Similar logic can be applied to functional abnormalities like disrupted blood oxygenation in positron emission tomography (PET) scans, anomalous networks in imaging that test functional connectivity or cognitive deficits on neuropsychological tests. If people who self-report histories of TBI differ functionally from those who do not, then construct validity is supported. If the nature of the functional abnormality is consistent with the known effects of TBI, then the conclusion that there is construct validity is strengthened.

## Screening Tools

A number of instruments have been developed for assessing lifetime history of TBI (see Table 1). Though the information in Table 1 is not comprehensive, it represents those methods for which systematic research has been conducted to establish reliability and validity.

**Table 1: Valid and Reliable Screening Tools**

Instrument	Instrument Information
Boston Assessment of Traumatic Brain Injury Lifetime (BAT-L) <sup>20</sup>	<ul style="list-style-type: none"> <li>• 15–37 items depending on history of 1, 2 or 3 TBIs.</li> <li>• Length of administration depends on number of TBIs and version.</li> <li>• Administered by doctoral-level neuropsychologists or other comparably trained professionals.</li> <li>• Developed for military service members with adaptations for civilian and domestic-violence uses.</li> <li>• Lifetime history of TBI.</li> <li>• Free.</li> </ul>
Brain Injury Screening Questionnaire (BISQ) <sup>21</sup>	<ul style="list-style-type: none"> <li>• 3 sections/173 items.</li> <li>• 10–15 minute administration.</li> <li>• Self-report or administered with assistance.</li> <li>• Lifetime history of TBI.</li> <li>• Pediatric &amp; adult versions/scored, then mini-report generated.</li> <li>• \$10–\$15 per administration.</li> </ul>
Defense and Veterans Brain Injury Center’s Brief TBI Screen (BTBIS) <sup>22</sup>	<ul style="list-style-type: none"> <li>• 3 questions with 6–8 sub-questions each.</li> <li>• 3-5 minute administration.</li> <li>• For military service members post-combat.</li> <li>• TBIs incurred during deployment.</li> <li>• Free.</li> </ul>
Ohio State University TBI Identification Method (OSU TBI-ID) <sup>23,24,25,26</sup>	<ul style="list-style-type: none"> <li>• 3-step interview.</li> <li>• 3–5 minute administration.</li> <li>• Administered by anyone who completes online training.</li> <li>• Lifetime history of TBI.</li> <li>• Free.</li> </ul>
TBI Questionnaire (TBIQ) <sup>27</sup>	<ul style="list-style-type: none"> <li>• 3 sections.</li> <li>• 15-minute administration.</li> <li>• Administered by clinician.</li> <li>• History of common TBIs, symptom severity and physical and behavioral symptoms.</li> <li>• Free.</li> </ul>
Brain Check Survey <sup>28</sup> (for children and youth)	<ul style="list-style-type: none"> <li>• 3 sections/173 items.</li> <li>• 10–15 minute administration.</li> <li>• Parent-/guardian-report measure.</li> <li>• History of TBI, other sources of brain impairment and physical and behavioral symptoms.</li> <li>• Intended for children &amp; youth.</li> <li>• Free.</li> </ul>

## The OSU TBI-ID

The remainder of this brief addresses the OSU TBI-ID, which was developed by John Corrigan and Jennifer Bogner at the Ohio State University. It has been the most widely used instrument, including in behavioral health settings. Several states currently use this instrument to partner with state systems to identify a history of TBI, which can then yield better intervention strategies and subsequent outcomes. The OSU TBI-ID typically requires three to five minutes when administered as a structured interview. A self-administered version has also been validated.<sup>29</sup> The instrument has been incorporated into electronic health records, including EPIC and Cerner systems. There are Spanish, Chinese, Afrikaans and Finnish translations. Because the development of the OSU TBI-ID was supported in part by federal funding, all aspects of its use, including access to online training, is available free of charge.

Reliability of the OSU TBI-ID has been demonstrated by both inter-rater and test/retest reliability.<sup>30,31,32,33</sup> As described above, the validity of the OSU TBI-ID is based on the ability to use indices derived from the measure to predict whether a person is currently experiencing affective, behavioral or cognitive effects of their lifetime exposure to TBI.<sup>34,35</sup> Most research using the OSU TBI-ID reduces the results to make a dichotomous present/absent distinction; however, there have also been studies looking at specific indicators. The worst TBI experienced in one's lifetime has been studied the most. Having had at least one TBI with loss of consciousness increases risk for a multitude of negative health consequences; one moderate or severe TBI further increases those risks.<sup>36,37,38,39</sup>

Less research has been conducted on the age at which people had their first TBI. One recent study found that a TBI with loss of consciousness before age 20 was associated with adult binge drinking.<sup>40</sup> Earlier studies that used a younger age cutoff (i.e., age 15) did not find greater risk associated with age at first injury.<sup>41,42,43</sup> How recently one had their last TBI is also a summary indicator drawn from the OSU TBI-ID. A study using data from the National Health and Retirement Survey found that a recent TBI was associated with greater loneliness among older adults.<sup>44</sup>

Construct validity of the OSU TBI-ID is further supported by studies that have found a positive history associated with both structural and functional brain changes observed in imaging<sup>45,46,47,48,49,50</sup> and proteomic biomarkers.<sup>51,52,53</sup> Construct validity is also evident in the results from multiple studies that show differences between subgroups of the general and clinical populations with and without a history of TBI (e.g., those treated for substance use disorders,

older adults in residential settings, prisoners, veterans, persons with spinal cord injuries).<sup>54,55,56,57,58,59,60,61,62,63,64</sup>

The OSU TBI-ID has been used to estimate prevalence of a history of TBI in the general population as well as clinical populations. Given that the validity of the instrument is based on its ability to predict that there are residual effects of past TBIs, prevalence determined from the OSU TBI-ID is probably best interpreted as the proportion of the population studied with residual effects and not the proportion who have ever experienced an injury that meets the criteria of a TBI (which can be a very minor injury). Supporting this conclusion were studies conducted on the Christchurch Birth Cohort. Results from the OSU TBI-ID administered when the cohort was 35 years old were compared to medical records that were captured at time of injury from birth to age 15. Most of the cohort accurately reported whether or not they had experienced a medically attended TBI with loss of consciousness 19 to 35 years previously. Less severe TBIs were not recalled as accurately as those involving loss of consciousness.

As already described, the OSU TBI-ID was developed based on the contribution of specific indices to predicting current functioning. That research started with a very extensive interview that elicited almost every aspect of a TBI that might be related to its persistent effects (e.g., severity, cumulative severity, number of TBIs, age at injury, medical attention required, symptoms experienced immediately, symptoms that persisted, etc.). This developmental instrument was called the “Research Version.” Once the validation research identified a subset of indices of lifetime exposure that were predictive of current functioning, the Research Version was shortened to the version currently called the OSU TBI-ID. (The authors erroneously created confusion by initially calling that version the “Short Version” when it was the version resulting from validation.) That version is available at the OSU TBI-ID: [https://wexnermedical.osu.edu/-/media/files/wexnermedical/patient-care/healthcare-services/neurological-institute/departments-and-centers/research-centers/ohio-valley/osu\\_tbiform\\_july2013.pdf](https://wexnermedical.osu.edu/-/media/files/wexnermedical/patient-care/healthcare-services/neurological-institute/departments-and-centers/research-centers/ohio-valley/osu_tbiform_july2013.pdf).

In response to requests from the field, the OSU TBI-ID has been adapted for use in surveys and shortened for incorporation into clinical protocols. These adaptations have retained key components that are fundamental to their validity. People require prompting of their memories to maximize their recall, particularly of less severe or more remote TBIs. Depending on the intentions of the users, trade-offs can be made. For instance, if the primary interest is only more severe TBIs, then less prompting may be necessary. A second tenet in adaptation has been that the respondent is not asked to self-diagnose.

All versions inquire about injuries to the head or neck, not concussions or TBIs. A TBI is determined when an injury that resulted from an external force is reported to have resulted in an immediate alteration of consciousness. Despite the preservation of these principles when adapting or shortening versions, the resulting instruments may not have the reliability and validity of the original OSU TBI-ID.

The OSU TBI-ID is the most widely employed instrument for capturing lifetime history of TBI. Providers in multiple states are using the OSU TBI-ID for screening clinical populations, including clients in behavioral health treatment, high-risk adolescents, victims of domestic violence, prisoners, homeless individuals and older adults. It is included in the federally funded TBI Model Systems<sup>65</sup> and TRACK-TBI longitudinal studies.<sup>66</sup> It was adapted for use in the Chronic Effects of Neurotrauma Consortium (CENC) national database of military service members and veterans.<sup>67</sup> It is used in the ABCD longitudinal study of adolescent health and development.<sup>68</sup> It was used in the 2014 National Health and Retirement Survey,<sup>69</sup> and in several states has been adapted for the CDC's Behavioral Risk Factors Surveillance System.<sup>70</sup> It is included in the PhenX Toolkit of instruments that were developed to be used in conjunction with the Human Genome Project.<sup>71</sup> As a result, the tool has been used in numerous peer-reviewed scientific publications.

## Summary

To effectively support individuals with brain injury and co-occurring behavioral health conditions, the behavioral health professional has to know they are working with an individual with brain injury. As discussed in this section, often people do not come to the behavioral health system with a diagnosis of brain injury. Therefore, screening for lifetime history of brain injury using a valid and reliable instrument best suited for behavioral health settings is an important first step to ensuring successful outcomes for this population.

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# Section V: Modifying Clinical Interventions for TBI

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## Introduction

Most individuals with TBI will seek and receive mental health services at some point during their recovery. The constellation of physical, cognitive and behavioral changes that people with TBI experience is likely to cause high levels of distress and interfere with daily functioning. Mental health services are an important component of brain injury rehabilitation. Individuals with TBI usually receive comprehensive brain injury rehabilitation services, which may include mental health treatment. However, people with TBI may still seek out mental health services on their own accord when the emotional distress becomes unmanageable and disruptive, especially if they are not connected to rehabilitation services. Since TBI can be a chronic condition, individuals may seek mental health services at different times post-injury. This window can vary greatly, ranging from days or weeks post-injury to 10 or more years post-injury.

The objective for this section is to highlight the importance of understanding the unique factors to consider when providing mental health services to people with TBI. Understanding these factors will help state brain injury program personnel to more effectively partner with their state mental health agencies to improve outcomes for people with TBI and co-occurring behavioral health conditions.

Adults with brain injury are often diagnosed with a range of mood and anxiety disorders. They may present with increased suicidality, impulsivity or risk-taking behavior. They may experience interpersonal conflict and marital dissatisfaction. They may have difficulty gaining or maintaining employment. Children and adolescents with TBI may be diagnosed with a range of childhood psychiatric and learning disorders and could face adjustment problems and academic and social difficulties in school.



While existing diagnostic procedures and treatments for these disorders may be effective for symptom reduction and functional improvement in other clinical populations, their effectiveness with people with TBI depends on how well they are modified and implemented to account for the unique factors relevant to this population.

In this section, we offer recommendations regarding how to approach diagnosis and treatment of mental health disorders in people with TBI. Ideally, services should be provided by mental health professionals with knowledge and/or expertise in brain injury rehabilitation. However, because access to specialized providers may not always be an option, it is important for all mental health providers to be aware of the unique factors discussed in this section, to have access to resources available for providers and to seek consultation, when necessary, prior to engaging in treatment with people with TBI.

## **Considerations and Best Practices for Diagnostic Procedures**

### **Epidemiology of psychiatric disorders**

People with TBI present with a range of psychiatric disorders and often at a higher rate than the general population. Common diagnoses include mood disorders (including major depressive, dysthymic and bipolar disorder), anxiety disorders (including generalized anxiety, posttraumatic stress, obsessive-compulsive, panic, acute stress disorders, and agoraphobia and social phobia), psychotic disorders and substance use disorders. In addition, people with TBI may present with personality changes (apathy, affective lability, aggression, behavioral disinhibition), impaired self-awareness, suicidality and socially inappropriate behavior.

Similarly, children and adolescents experience many of the same emotional and behavioral difficulties post-TBI as adults, with children most commonly experiencing depression, anxiety, personality changes (affective instability, aggression, disinhibited behavior and apathy), psychosis/paranoia, secondary attention-deficit/hyperactivity disorder (ADHD), oppositional defiant disorder/conduct disorder, posttraumatic stress disorder and mania/hypomania.

*It is important to note that the brain injury could either cause or worsen preexisting mental health problems.*

## **The risk of misdiagnosis**

People with TBI may seek mental health services, either without disclosing their TBI status to the provider or without inquiring whether the provider has familiarity with the clinical profile of TBI. As a result, they may not be properly diagnosed. A proper diagnosis is essential for effective treatment.

Misdiagnosis can occur because the presenting psychiatric symptoms are not considered in the context of TBI but are instead diagnosed in isolation. For example, people with TBI may experience emotional lability and behavioral dysregulation because of disruption in their executive functions. These symptoms, however, may resemble symptoms of bipolar disorder. If a person with TBI is diagnosed with bipolar disorder, they may receive inappropriate and ineffective treatment, which may also have a negative impact on the provider's prognosis and the patient's experience with the mental health system.

## **Causes of distress: Neurological versus psychogenic**

The origins of the emotional and behavioral symptoms that people with TBI present with may be neurological or psychogenic in origin. Symptoms could be caused by the direct impact of the injury on neurological functioning (e.g., lesions, axonal damage, infection, neurochemical disruption, cerebrovascular changes). For example, depressive symptoms could be associated with disruption in serotonergic neural circuits. Symptoms, however, could also be psychogenic in nature. In this case, depression may be a reaction to the broader losses a person with TBI experienced after the injury: loss of autonomy and independence, loss of employment and income or loss of social connections and outlets.

While it may not be possible to accurately identify the cause of the emotional or behavioral disturbance, it is important that both be explored and addressed. Focusing on either the neurological or the psychological while ignoring the other may render the treatment ineffective. If, for example, the mental health provider attempts to address depressed mood by prescribing the recommended dose of an antidepressant while ignoring endocrine dysfunction caused by the brain injury, the treatment may fail to lead to the desired outcomes. Similarly, if mood dysregulation persists despite appropriate pharmacotherapy, the provider may need to explore environmental stressors and engage the patient in psychoeducation and coping-skills training relevant to a person with TBI. In pediatric TBI, the interaction between brain dysfunction and ongoing developmental processes can impact the onset and presentation of symptoms and further complicate diagnosis and treatment decisions.

## **Factors to consider when administering diagnostic instruments to people with TBI**

Diagnostic methods and procedures do not generally differ for patients with TBI. Similar to other clinical populations, an in-depth interview with the patient and collateral sources, clinical observations, and use of screening and assessment tools and measures are ideal in helping providers make accurate diagnoses. Mental health providers already use many of the screening and assessment tools recommended in assessing mental health difficulties for those with TBI (e.g., SCAT-5, BDI-II, BAI, MMPI-2). However, it is important for providers to understand the limitations of these measures when used in the TBI population.

First, reduced cognitive functioning after TBI can complicate the diagnostic process. Problems with attention, short- and long-term memory, reading comprehension or verbal fluency may render a diagnosis incomplete or invalid. These cognitive challenges may impact a patient's ability to provide accurate information during a clinical interview and/or their ability to complete assessments.

Below are some general suggestions for conducting psychiatric diagnostic assessments with people with TBI. The provider could:

- Read the instructions to the patient aloud.
- Ask the patient to repeat the instructions to ensure they understand them.
- Read the items of a self-administered measure to the patient and record their responses.
- Obtain corroborating information from significant others.

Moreover, symptom presentation and severity can be influenced by other factors such as severity of injury, anosognosia, impaired self-awareness, premorbid personality, premorbid psychiatric history, current substance use, perceived social support, and reaction and adjustment to injury. In addition, pain and sleep disorders, which are common among people with TBI, can confound or complicate diagnosis.

## Selection of diagnostic instruments

Asking the client during the interview if they experience any cognitive challenges in daily life, as well as completing a brief cognitive screening measure (e.g., the Montreal Cognitive Assessment [MoCA], Mini-Mental Status Exam [MMSE]) could help identify any potential cognitive challenges and determine if a referral for a more thorough neuropsychological assessment would facilitate diagnosis and treatment. If cognitive deficits are suspected, referral to a neuropsychologist is recommended. A comprehensive neuropsychological evaluation can help providers better understand the client's cognitive challenges and how they might impact psychological functioning. If screening measures like the MoCA or the MMSE are to be used, the provider is encouraged to receive training in their administration.

Below are resources that are available to clinicians and researchers to facilitate the selection of measures and tools when assessing psychological outcomes post-TBI. These resources include adult and pediatric measures to help clinicians assess psychiatric disorders in clinical and research settings. They also provide information about the validity limitations of the measures in the population domains and measures of common data elements.

- The National Institute of Neurological Disorders and Stroke (NINDS) Common Data Elements (CDE). (n.d.). *Traumatic Brain Injury*. <https://www.commondataelements.ninds.nih.gov/Traumatic%20Brain%20Injury#pane-89>.
- Searchable database of instruments for clinicians and researchers for various medical conditions, including TBI. Shirley Ryan AbilityLab (2022). *Rehabilitation measures database*. <https://www.sralab.org/rehabilitation-measures>.

## Considerations and Best Practices for Clinical Interventions

In the last two decades, several interventions have been developed to address emotional and behavioral challenges in children and adults with TBI. Some of these interventions were developed by modifying existing evidence-based practices in other clinical populations, while others were created within the context of brain injury rehabilitation, considering the unique factors that influence treatment process and outcomes in people with TBI.

We begin this section by reviewing the unique-to-TBI factors that could negatively affect the treatment process, and therefore treatment outcomes. Subsequently, we provide recommendations for how to modify existing interventions when working with people with TBI. Finally, we provide a list of evidence-based practices from studies based on people with TBI.

While extremely important for treatment outcomes, in our discussion we omit reference to systemic factors that could interfere with treatment (e.g., proximity to healthcare settings, cost of services and insurance coverage, availability of providers familiar with TBI, transportation challenges) because they are beyond the scope of this chapter.

## **Factors to consider when delivering treatment to people with TBI**

### ***1. Cognitive impairments***

People with TBI may experience reduced cognitive functioning that ranges in duration and severity. While specific cognitive rehabilitation interventions exist to target problems in cognitive functions like attention, memory and executive functioning, TBI-related cognitive deficits can interfere with the effectiveness of mental health services when these services are not combined with cognitive rehabilitation.

### ***2. Impaired self-awareness***

People with TBI may present with deficits in self-awareness, which could range from anosognosia (lack of awareness that mental functions are impaired and disruptive to daily functioning) to poor anticipation of consequences (unable to predict that a certain maladaptive behavior will cause further problems). It is important for providers to a) assess the level of self-awareness through standard measures or collateral interviews with caregivers and/or other providers, and b) determine whether self-awareness is the target or a by-product of treatment. It is not uncommon to expect that as self-awareness increases, psychiatric symptoms may be exacerbated as the person becomes more aware of the challenges and losses incurred because of the TBI.

## **Modifying existing interventions**

In this section, we provide some examples of how different TBI-related cognitive deficits can interfere with both the process and outcome of mental

health treatments and recommendations on how to modify the provider's approach to accommodate for the impairment.

Shown in Table 2 are challenges related to brain injury and recommendations on how to modify the provider's approach to accommodate for the impairment.

**Table 2: Challenges Related to Brain Injury and Recommendations**

Challenges	Recommendations
<p>Remembering appointments.</p> <p>Memory problems may prevent people with TBI from remembering scheduled appointments.</p> <p>Skipping appointments may be disruptive for the continuity of care and may also be a source of frustration for providers who would have to deal with no-show clients and rescheduling.</p>	<p>Encourage consistent use of a calendar, set up alerts and reminders on a smartphone, send reminder emails or texts and explore other strategies that may reduce forgetting (e.g., sticky notes).</p>
<p>Remembering content of sessions.</p> <p>Memory problems may make it difficult to remember the content of a session between visits.</p> <p>People with TBI may fail to apply and generalize insights gained and coping skills demonstrated during sessions beyond the therapeutic context. As a result, the presenting problems may persist and require extending the duration of services.</p>	<p>Break down important information into manageable chunks, summarize the highlights of a session, encourage the client to keep a journal for recording these highlights, help them enter the information in the journal at the end of the session and review the entry at the beginning of the next session.</p>
<p>Remembering to do homework.</p> <p>Assigning homework is important for skill transfer and generalization.</p> <p>Memory problems may interfere with the completion of homework assignments because the client may forget that they had to do a homework assignment or what the requirements of the assignment were.</p>	<p>If homework assignments are used, ensure that they are assigned consistently, as opposed to periodically (e.g., for every session).</p> <p>Provide clear instructions and ensure that the client understands what the assignment is.</p> <p>Have the client write down the instructions somewhere that increases the probability that they will locate the information between sessions (e.g., the session journal, their calendar, a to-do list, a homework notebook).</p> <p>Review the assigned homework</p>

Challenges	Recommendations
	<p>during the following session to make it an integral component of the session.</p> <p>If possible, send email or text reminder ahead of time, checking progress on the homework.</p>
<p>Staying focused.</p> <p>Challenges with sustained attention may make it difficult to stay focused for prolonged periods during the session.</p> <p>People with TBI may drift in and out of the session, may miss important points due to inattention or may become mentally fatigued more easily.</p>	<p>Make the sessions shorter, take breaks during the session and periodically check in with the client to ensure they remain focused.</p>
<p>Being easily distracted.</p> <p>Clients may be easily distracted by extraneous triggers, such as sounds, movements or objects in the environment, which will interfere with their focus on session content.</p>	<p>Hold sessions in a less visually “busy” setting (e.g., have the client face wall art instead of a busy bookshelf or interior window).</p> <p>Reduce the amount of ambient noise or sounds that can be distracting.</p>
<p>Slow rate of comprehension.</p> <p>Reduced processing speed may interfere with how quickly a person with a TBI can understand a complex concept or learn a skill.</p>	<p>Engage in slower and more deliberate communication.</p> <p>Use multiple modalities to present information and repeat concepts and instructions.</p>
<p>Slow rate of responding.</p> <p>Slow processing speed leads to delays in responding because more time is required to access information from long-term memory, organize thoughts and ideas and formulate a response. This may be frustrating to the provider and may make the client seem more impaired or less engaged.</p>	<p>Allow clients ample time to respond to a question or to describe an event or experience.</p> <p>Indicate that there is no pressure to provide a response fast.</p>
<p>Difficulty making decisions.</p> <p>People with TBI often report feeling “stuck” because they have difficulty engaging in problem-solving and decision-making.</p> <p>They may present as overthinking a problem or, conversely, avoiding a task or abandoning a goal.</p>	<p>Help the client clarify the decision to be made.</p> <p>Facilitate decision-making by using strategies like a “pros and cons” analysis.</p> <p>Engage the client in an evidence-based problem-solving approach. Help the client generate viable choices.</p>
<p>Difficulty initiating behavior.</p>	<p>Make sessions more structured (e.g.,</p>

Challenges	Recommendations
<p>People with TBI may have difficulty initiating conversations and bringing up relevant topics.</p> <p>They may fail to follow through with homework assignments or to practice recommended coping strategies.</p>	<p>set up a Q&amp;A format).</p> <p>Ask clients (or family if relevant) to keep notes or generate questions during the week, which can provide content for the session and help recall.</p> <p>Set up motivators that encourage clients to complete tasks.</p>
<p>Getting easily overwhelmed.</p> <p>People with TBI may feel easily overwhelmed and experience cognitive “flooding” even in the presence of minimal stressors.</p> <p>They may have difficulty accomplishing daily tasks because of the distress.</p>	<p>Focus on a small number of topics during a session.</p> <p>Encourage the use of to-do lists.</p> <p>Recommend against engaging in multitasking.</p> <p>Teach relaxation and mindfulness techniques.</p>
<p>Photosensitivity.</p> <p>People with TBI may present with sensitivity to bright lights, which may prevent them from being able to focus on the session.</p>	<p>Adjust the lighting in the room or encourage the person to wear photoprotective gear, such as sunglasses or visors.</p>
<p>Fatigue.</p> <p>Both physical and cognitive fatigue can interfere with treatment.</p> <p>The physical effort of traveling to the treatment setting may affect attendance and participation.</p> <p>The client may only be able to process a limited amount of information.</p> <p>It is not uncommon for people with TBI to feel fatigued for several days after a day of strenuous physical or mental activity.</p>	<p>Keep sessions shorter, if necessary.</p> <p>Give breaks.</p> <p>Help clients manage their activity level to prevent the onset of debilitating fatigue.</p> <p>Schedule manageable treatment-related activities between sessions.</p>
<p>Alexithymia.</p> <p>The neurological impairment of the brain injury may leave a person with TBI unable to recognize, process and be aware of their own affective responses.</p> <p>In addition, they may misread or ignore emotional cues in other people.</p>	<p>Be cautious not to interpret lack of emotional awareness as a psychiatric symptom (e.g., anhedonia) or as an attempt of denial.</p> <p>Obtain information about the person’s emotional state without expecting them to accurately label their emotions.</p> <p>If possible, focus the treatment on increasing emotional awareness.</p>



# Evidence-based Mental Health Treatments for People with TBI

While existing interventions could be modified to be delivered to people with TBI, research involving people with TBI has yielded several evidence-based practices for a range of psychiatric disorders, some of which are included below.

## Adults

- Cognitive behavioral therapy for post-TBI depression.<sup>1,2,3</sup>
- Mindfulness-based cognitive therapy for post-TBI depression.<sup>4</sup>
- Modified cognitive behavioral therapy (CBT plus motivational interviewing and/or nondirective counseling) for post-TBI depression and anxiety.<sup>5</sup>
- Cognitive behavioral therapy for post-TBI hopelessness.<sup>6</sup>
- Acceptance and commitment therapy for post-TBI psychological distress.<sup>7</sup>
- Goal management training (with external cuing and an emotional regulation module) improves post-TBI emotion-regulation skills and quality of life.<sup>8</sup>
- Emotion-regulation intervention for post-TBI emotion dysregulation.<sup>9</sup>

## Children

- Prolonged exposure treatment for children with post-TBI post-traumatic stress disorder (PTSD).<sup>10</sup>
- Problem-solving treatment program for post-TBI psychosocial functioning (adolescent internalizing behavior and depressive symptoms).<sup>11</sup>
- Cognitive behavioral therapy for post-TBI psychological adjustment (self-management and compliance).<sup>12</sup>

- Positive parenting skills program for post-TBI child behavior and parenting skills.<sup>13</sup>

## **Couples or Caregivers (adults and children)**

- Problem-solving family intervention reduces psychological distress for caregivers of adolescents with TBI.<sup>14</sup>
- TBI caregiver intervention for improving emotional, instrumental and professional support and brain injury knowledge.<sup>15</sup>
- Family intervention for parental distress following pediatric TBI.<sup>16</sup>
- Online problem-solving program for teens to improve problem-solving skills and reduce depressive symptoms for caregivers.<sup>17</sup>
- Problem-solving intervention for improving self-efficacy and depression for caregivers of adolescents with TBI.<sup>18</sup>
- Parenting skills program for psychological distress for caregivers of children with TBI.<sup>19</sup>
- Parenting intervention for depression for caregivers of children with TBI.<sup>20</sup>
- Therapeutic couples intervention for reducing unmet needs and burdens for caregivers following TBI.<sup>21</sup>
- Couples intervention for improving dyadic adjustment and communication.<sup>22</sup>

## **Summary**

While behavioral issues can present a number of significant challenges, there are new or adapted strategies and interventions that can help with addressing these issues for children and adults with TBI. These approaches are evidence-based and shown to be effective for improving outcomes for returning to school, community and work.

It is important to collaborate with your state mental health system on what might work best and for which settings.

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# Section VI: Modifying Psychopharmacologic Interventions for TBI

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## Introduction

Alterations of mood, cognition and behavior are common after TBI. These posttraumatic neuropsychiatric symptoms are best understood in the context of a biopsychosocial model in which structural and/or functional disruption of key brain circuitry; pre-injury personality traits; and family, sociocultural, economic and other medical factors may each play variable roles in determining an injured individual's unique symptoms burden. Ideal treatment of posttraumatic neuropsychiatric symptoms thus involves a comprehensive, multipronged treatment approach tailored to the individual's specific cognitive, emotional and social needs. Psychopharmacologic treatment, often a crucial component of this treatment paradigm, is most effective when delivered in tandem with non-pharmacologic supportive strategies.

As Sir Charles Symonds famously put it in 1937, to understand psychiatric symptoms after head injury, "it is not only the kind of injury that matters, but the kind of head."<sup>1</sup> In TBI, traumatic alterations of key neural circuitry are only one part of the overall picture; these changes must be understood within the context of a whole person whose unique personality structure, preexisting psychiatric vulnerabilities and life experience will influence the expression of posttraumatic psychiatric symptoms. Appreciation for these multifaceted biopsychosocial influences on psychiatric symptomatology is a fundamental aspect of psychiatric care in any population. While some of the details of pharmacotherapy in TBI may differ from those of general psychiatric practice, the broad framework is the same.

The goal of this section is to provide state brain injury personnel with the necessary background and information to effectively communicate with their behavioral health partners and provide them with an array of accessible approaches for modifying psychopharmacologic interventions for TBI.

## General Approach

Effective pharmacologic treatment of any psychiatric issue begins with a psychiatric assessment in which specific target symptoms are identified. From this, a working diagnosis is developed and rational pharmacotherapy is initiated, drawing on the available evidence base to address target symptoms within the context of the working diagnosis. Ongoing monitoring for treatment response and emergence of adverse effects provide feedback that can be used to revise the diagnosis and treatment plan as needed.

Pharmacologic treatment of psychiatric symptoms after TBI follows this same basic process, albeit with several unique clinical challenges. Posttraumatic cognitive impairment, neurologic sequelae and medical complications can interact with psychiatric symptoms to produce complex symptom constellations that are anything but straightforward to interpret. Even once a diagnostic framework is established, the evidence base for treatment is limited by a relative dearth of randomized controlled trials and substantial methodological variability across the studies that do exist.<sup>2</sup> Medications developed for primary psychiatric disorders may not always translate effectively to psychiatric symptoms in TBI, and individuals with TBI are at increased risk of adverse effects with any psychotropic medication trial.

All of this being said, pharmacotherapy can be a crucial and often highly effective component of treatment for posttraumatic neuropsychiatric disturbances. Adherence to a systematic approach that emphasizes identification of specific psychiatric, cognitive and behavioral target symptoms is key. Depending on the clinical scenario, rational prescribing for posttraumatic neuropsychiatric symptoms may be extrapolated from data related to the primary psychiatric disorder they most resemble; informed by studies specific to TBI, if available; or driven by a hypothesis of the neurotransmitter disturbances involved based on the extent and location of structural brain injury.

Psychiatrists already possess the fundamental clinical evaluation skills and familiarity with basic neurochemistry and psychopharmacology needed to evaluate and treat posttraumatic neuropsychiatric symptoms effectively. In the following sections, we discuss modifications to the standard psychiatric evaluation that can improve diagnostic clarity in TBI and provide an overview of key principles of TBI psychopharmacology. The key is to empower psychiatrists to adapt their existing skill sets to meet the complex — but often highly treatment-responsive — psychopharmacologic needs of this deeply underserved population.



# Psychiatric Assessment: Modifications for TBI

Assessment of neuropsychiatric symptoms in TBI begins with the standard initial psychiatric evaluation familiar to all psychiatrists. This is supplemented with additional history and examination geared toward identifying common neurocognitive and neurobehavioral sequelae of TBI that may confound psychiatric diagnosis and/or represent independently treatable target symptoms.

## Before beginning: Timing of assessment relative to injury

TBI is a dynamic process in which primary mechanical injury triggers a secondary cascade of damaging neurochemical events that may extend well beyond the primary injury in both time and space. At the same time, focal brain injury may trigger a transient increase in the brain's capacity for reorganization (i.e., neuroplasticity). The combined impact of these interacting processes promoting injury and recovery, respectively, creates a situation in which dramatic neurobehavioral changes are expected in the first days, weeks and months following TBI, independent of any psychopharmacologic intervention.

Acute recovery from a TBI follows a generally predictable trajectory in which initial loss of consciousness is followed by emergence into an acute confusional state, most commonly referred to as posttraumatic amnesia (PTA).<sup>3</sup> The core feature of PTA is impaired memory consolidation, and additional features of delirium (e.g., sleep-wake disturbances, hallucinations) are variably present. Return of continuous memory consolidation marks the end of PTA. Injured individuals are invariably amnesic for this period of time (and may report it retrospectively as time spent unconscious). The length of time spent in PTA correlates closely with injury severity and is a strong predictor of a wide range of functional outcomes after TBI. Residual cognitive impairment, especially with regard to executive function, is common after emergence from PTA; further recovery varies by individual and may continue for months or years after injury.

Having a general sense of the length of time from injury thus provides important background context for psychiatric assessment with TBI. The more recent the injury, the more plausible it is that an individual may still be making his or her way along this continuum. For these individuals, frequent reassessments are especially important to ensure that the

psychopharmacologic regimen is keeping pace with the neurobehavioral changes that are expected to occur during natural recovery.

## Psychiatric interview

As in routine psychiatric practice, a history of the present illness (HPI) is obtained via a combination of open-ended questioning and screening via the psychiatric review of systems (ROS). It is worth bearing in mind that cognitive impairments, especially in the areas of self-awareness and verbal communication, may make it difficult for individuals with TBI to appreciate and report symptoms accurately. In light of this, collateral information from a reliable family member or other caregiver is crucial, especially for those with more severe injuries.

In addition to the inquiries about mood, anxiety, psychosis and other psychiatric target symptoms that comprise the standard psychiatric HPI and ROS, several neuropsychiatric symptom domains warrant special attention in TBI:

1. *Disorders of sleep and wakefulness* are extremely common after TBI and should be assessed even if these are not part of the presenting complaint, as poor sleep and/or impaired daytime wakefulness can substantially exacerbate existing cognitive and psychiatric symptoms and can reduce the injured person's capacity to cope with various stressors. Insomnia, fatigue and reduced daytime arousal or excessive daytime sleepiness each represent independent target symptoms that are potentially amenable to pharmacotherapy.
2. *Emotional and behavioral dyscontrol* are common after TBI.<sup>4</sup> These problems typically resolve in the post-acute period after mild TBI but may persist in more severely injured individuals. Emotional dyscontrol may manifest as irritability, affective lability, or pathologic laughing and crying (also known as pseudobulbar affect). Behavioral dyscontrol may manifest as disinhibition or aggression. While these symptoms commonly co-occur with other posttraumatic neuropsychiatric disturbances, they are target symptoms in their own right.
3. *Disorders of diminished motivation* are common in TBI and occur along a spectrum from apathy, at the mild end, to akinetic mutism at its most severe. Apathy often co-occurs with depression, though it can present in isolation and is a potential target symptom.<sup>5</sup>

4. *Agitation* is a nonspecific term that may refer to a wide range of problematic behaviors including, among others, motor restlessness (akathisia), impulsivity or explosive behaviors.<sup>6</sup> Agitation is often multifactorial in etiology and may be driven by the combined effect of other neuropsychiatric symptoms, physical discomfort, cognitive-communication limitations and environmental stressors, among others. When agitation is reported by collateral informants, it is essential to elicit detailed descriptions of specific problematic behaviors and probe for possible underlying triggers. Given its broad range of manifestations and etiologies, agitation is not itself a specific target symptom; rather, it is usually driven by one or more target symptoms that themselves may warrant intervention.
  
5. *Neurocognitive symptoms* are a major contributor to functional and behavioral impairments in TBI of all severities, especially in moderate and severe injuries, and their assessment is crucial. Cognitive problems may be reported subjectively by the individual or observed by a collateral informant. The cognitive domains most often affected by TBI are attention, processing speed, memory and executive function.<sup>7</sup> Neurocognitive symptoms are important potential targets of pharmacotherapy in individuals with TBI. Effective treatment of these symptoms can produce helpful downstream effects for other psychiatric symptoms as well as for overall level of functioning.

## Medical and Neurological Review of Systems

Psychiatrists are well aware of the crucial role they play in the care of individuals with co-occurring psychiatric and medical problems. Psychiatric illness can make it difficult for individuals to appreciate somatic symptoms and report them in a way that is readily interpreted by medical providers. Even when symptoms are reported accurately, the persistence of widespread stigma associated with mental health diagnoses can produce unconscious bias on the part of medical providers that may confound diagnostic assessment.

These issues are especially relevant in TBI. Medical complications of TBI can contribute to neuropsychiatric symptoms, and the presence of neuropsychiatric symptoms may interfere with the injured individual's ability to seek out and participate appropriately in necessary medical care. Armed with a combination of medical training and experience navigating challenging

behaviors and communication styles that make them unique within the healthcare system, psychiatrists can add tremendous value by cutting through the “noise” of complex neuropsychiatric presentations in TBI to identify potentially relevant underlying medical issues and facilitate further care with appropriate specialists.

In light of the time constraints associated with assessment in the outpatient psychiatry setting, we suggest a focused medical ROS covering the most common medical sequelae of TBI affecting the neurological, endocrine, gastrointestinal, genitourinary and musculoskeletal systems.

*Neurological symptoms* are of particular importance. Common issues include, but are not limited to:

- Headaches.
- Visual disturbances (e.g., loss of acuity, eye movement abnormalities).
- Vestibular system dysfunction (e.g., vertigo, imbalance).
- Seizures.
- Dysautonomia (e.g., postural orthostatic tachycardia syndrome [POTS] in milder injuries; paroxysmal sympathetic hyperactivity [PSH], often described as autonomic “storming,” in more severe injuries).
- Spasticity.
- Chronic pain.

Eye movement abnormalities, especially convergence insufficiency, are especially relevant in mild TBI, where they may be the sole, subtle, objective manifestation of central nervous system dysfunction. In addition to contributing to visual strain that can exacerbate headaches, oculomotor dysfunction can interfere with the performance of visually mediated cognitive tasks (reading, for example) and cause substantial psychological distress. Dysautonomia, increasingly recognized as a common complication of even mild TBI, can manifest as exercise intolerance or as episodic tachycardia, triggering anxiety or panic. Posttraumatic seizures can begin at any time after TBI, even years later, and may present subtly as attentional lapses or stereotyped behavioral changes in the absence of overt abnormal movements; abrupt onset or paroxysmal fluctuations of neuropsychiatric symptoms may raise concern about underlying seizure activity.

The pituitary gland is vulnerable to injury in TBI. Individuals with TBI may develop *neuroendocrine dysfunction* immediately post-injury or after a delay of months or years. Symptoms such as severe fatigue, excessive thirst or hunger, menstrual irregularities or erectile dysfunction may reflect posttraumatic hypopituitarism.

*Nausea and vomiting* are common after TBI. When present immediately post-injury, especially after moderate to severe TBI, intractable nausea and vomiting typically prompt investigation of structural causes of increased intracranial pressure. In the post-acute and chronic phases of recovery, considerations include migraine, vestibular dysfunction, or neurogenic gastroparesis due to TBI, among others.

*Bowel and bladder dysfunction* are common after TBI and can be a source of significant distress for injured individuals and caregivers. Incontinence may be related to altered sphincter control, impaired recognition of somatic voiding cues, or both. Constipation and urinary retention can be caused by TBI or may be caused or exacerbated by medications, including many psychotropics.

*Musculoskeletal pain* may be related directly to orthopedic injuries or to heterotopic ossification (HO), a process of aberrant bone formation in soft tissue triggered by central nervous system trauma that can cause substantial pain, immobility and joint deformity.

## **Details of injury**

Details of the TBI itself should be obtained to the fullest extent possible. An understanding of the injury severity and, ideally, extent and location of focal brain injury (if any) can provide helpful context for psychiatric symptoms, direct attention to specific potential cognitive symptoms and guide pharmacologic treatment. If medical records are not available, a rough approximation of injury severity may be elicited via questioning about presence and length of acute loss of consciousness, length of time spent in PTA, length of hospitalization, neurosurgical procedures and post-discharge utilization of inpatient and/or outpatient rehabilitation services.

## **Psychiatric and medical history**

Personal and family psychiatric history, substance use history, medical history and social and occupational history should also be elicited. A thorough exploration of pre-injury psychiatric and psychosocial functioning can provide essential background context for understanding posttraumatic neuropsychiatric symptoms. Premorbid substance use disorders in particular

may increase risk of TBI, and their presence or persistence after TBI can exacerbate other posttraumatic cognitive and neuropsychiatric symptoms. Similarly, ADHD has a bidirectional relationship with TBI in which ADHD increases risk of TBI, and TBI can exacerbate the cognitive and neuropsychiatric disturbances of ADHD. For individuals with cognitive dysfunction, taking a developmental history that includes any birth complications, developmental delays (milestones, need for early intervention services or therapies in early childhood) and educational accomplishment can provide helpful context.

The medical history should include a neurologic history attuned to common posttraumatic complications. A history of posttraumatic hydrocephalus and any associated cerebrospinal fluid shunting procedures may be relevant for individuals presenting with progressive neurocognitive or behavioral disturbances. Seizures are important to inquire about, as the presence of epilepsy may affect psychotropic medication choice, and antiseizure medications may have a wide range of adverse neuropsychiatric effects. In general, the medication list should be reviewed for potential contributors to cognitive impairment, sedation, akathisia or psychiatric disturbances.

### **Mental status exam**

The mental status exam (MSE) for TBI includes the standard psychiatric MSE plus some degree of objective cognitive assessment. While the initial psychiatric interview may yield relevant observations about gross cognitive function, brief in-office screening instruments can provide a measure of basic cognitive function across multiple domains. The most commonly used instruments are the MMSE; MoCA; and the Saint Louis University Mental Status (SLUMS) Examination.<sup>8</sup> These instruments are not TBI-specific, but they can nonetheless provide a rapid general overview of multi-domain cognitive function. The MoCA and SLUMS are preferred for their broader assessment of multiple cognitive domains; the MMSE covers fewer domains, though it is a quicker assessment that may be more practical for individuals who cannot tolerate longer testing. In our experience, such screening tools can be useful even for persons without overt cognitive complaints, as cognitive dysfunction is common after TBI of all severities and even subtle cognitive deficits may influence neuropsychiatric symptoms.

### **Further neurological and medical assessment**

Depending on the circumstances, a focused neurological exam, serum laboratory studies, neuroimaging and electroencephalography (EEG) can be useful adjuncts to the psychiatric assessment in providing additional data

about the extent, severity and location of focal brain injury. In addition to the serum studies typically obtained by psychiatrists as part of a comprehensive initial evaluation, we suggest lowering the threshold for obtaining pituitary hormone screenings, especially in patients presenting with neurovegetative symptoms, menstrual irregularities or sexual dysfunction.

Neuroimaging, preferably brain magnetic resonance imaging (MRI), should be obtained (or previous imaging reviewed) at least once for all individuals with TBI seeking psychiatric care, especially those with moderate or severe injuries. The presence of overt structural damage to key neurobehavioral circuitry — for example, the inferior frontal and anterior temporal cortices, which are commonly injured in TBI — can help to clarify the etiology of some symptoms and potentially influence treatment.

It is important to note here, however, that while evidence of focal brain injury as demonstrated by neurological exam or ancillary testing can support a history of TBI and provide useful information for treatment planning, absence of such evidence does not mean that a TBI did not occur, nor does it mean that lasting posttraumatic impairments are not possible. By definition, mild TBI is associated with normal structural imaging, and individuals with more severe injuries can also experience neurobehavioral impairments that appear disproportionate to the extent of injury visible on imaging. Diffuse axonal injury (DAI), which occurs in TBI as a result of shearing forces applied to the gray-white matter junction and brainstem, can cause devastating neurologic impairment despite relatively normal brain computed tomography (CT) imaging or only subtle abnormalities on brain MRI. If a new MRI is obtained, especially in an individual with reportedly normal prior imaging, it can be helpful to alert the reading radiologist to the suspected TBI history so that particular attention can be paid to the sequences most likely to reveal evidence of prior DAI (typically, susceptibility-weighted imaging [SWI] or gradient echo [GRE]).

## **Diagnostic formulation**

Psychiatric diagnosis is challenging in TBI; underlying central nervous system pathology can alter the expression of psychiatric illness and vice versa, leading to atypical presentations of both. Posttraumatic psychiatric symptom constellations frequently do not fit neatly into standard diagnostic categories. Rather than seeking a unifying psychiatric diagnosis, it may be more feasible to apply one or more “best fit” diagnoses to individual symptoms and symptom clusters. If a symptom cluster resembles a primary psychiatric disorder, even if formal criteria are not met, it is reasonable to conceptualize and treat along these lines. Alternatively, some symptoms may be better explained in isolation



as direct neurobehavioral sequelae of TBI. If a preexisting psychiatric illness was present, consider the possibility that some symptoms may represent a continuation or exacerbation of this illness, now manifesting atypically due to TBI.

Posttraumatic cognitive impairments may mimic features of psychiatric illness, especially when they occur in combination. The combination of slowed processing speed and impaired behavioral initiation may look like depression. Poor sustained attention coupled with impaired behavioral response inhibition can produce a restless, irritable hyperactivity similar to that of hypomania. The behavioral perseveration, impaired social cognition and pleasure-seeking behavior with limited capacity for deferred gratification that commonly occur after inferior frontal lobe injury can be mistaken for a willful disregard for instructions, lack of empathy and profound egocentricity, as might be seen in antisocial personality disorder.

In many cases, the etiology of a given symptom is not immediately clear on initial evaluation. In these cases, empiric treatment of a target symptom can be clarifying. In practice, the ultimate goal of psychiatric evaluation in TBI is to distill a complex, multifaceted presentation into a set of target symptoms that can be addressed via rational pharmacotherapy.

## **Psychopharmacologic Treatment: General Principles in TBI**

“Without a map, you cannot get to your destination”:<sup>9</sup> know your target symptoms.

While identification of clear target symptoms is essential to good psychopharmacologic practice in any population, it is of the utmost importance in TBI, where the organizational structure provided by a diagnosis may not be readily available. Absence of a clear, definitive psychiatric diagnosis need not preclude attempts at pharmacologic treatment as long as there is a solid rationale linking medication choice with target symptoms.



## Table 3: General Psychopharmacological Treatment Principles

### Whenever Possible, Add by Subtraction First

Medication lists in TBI can be long and may include agents that interact poorly with each other or with the injured person's neuropsychiatric substrate.

Before adding a new medication, consider whether reduction or removal of any medications might benefit target symptoms. In addition to the common offenders — antiseizure medications, sedative-analgesics, medications with significant anticholinergic burden — consider whether agents previously added to target neuropsychiatric symptoms could be producing paradoxical or otherwise unwanted effects — for example, increased anxiety and insomnia due to selective serotonin reuptake inhibitors (SSRIs) or stimulants; akathisia due to antipsychotics; urinary retention or constipation due to anticholinergic impact of amantadine, paroxetine, tricyclic antidepressants or atypical antipsychotics.

### "Start Low, Go Slow — but Go."

This well-known guiding principle of geriatric psychopharmacology applies equally to medication management in TBI. Individuals with TBI are sensitive to adverse effects of psychotropic medications. Initiation of any pharmacotherapy should begin with a low starting dose and be titrated gradually. Nonetheless, standard doses may be necessary to achieve therapeutic benefit.

In the absence of significant adverse effects, prescribers should avoid abandoning medication trials prematurely and should not be afraid to increase doses to therapeutic range, especially if lower doses are producing a partial treatment response.

### Reassess Frequently and Adjust as Needed

Even once accurately assessed, neuropsychiatric symptoms in TBI are something of a moving target. Symptom evolution is expected as the individual recovers, ages or encounters new physiologic or psychosocial stressors. The target symptoms, treatment response and presence of side effects must be reassessed frequently, with therapy adjusted accordingly.

### Avoid Polypharmacy — Most of the Time

Polypharmacy is a constant concern in TBI. Persons with TBI frequently need multiple medications to manage various medical comorbidities and simultaneously may be at increased risk of making medication errors due to cognitive impairment. All efforts should be made to streamline medication regimens.

This being said, in some cases where side effects have limited an otherwise successful or partially successful psychopharmacologic trial, dose reduction in conjunction with addition of a low dose of a second synergistic agent may provide a workaround that allows for improved symptom benefit while avoiding the side effects encountered at higher doses.

# Specific Posttraumatic Neuropsychiatric Syndromes

## Agitation

Agitation is a nonspecific term for a number of problematic behaviors that can occur after acquired brain injury, including disinhibition, aggression, restlessness, akathisia and inappropriate verbalization.<sup>10</sup> The causes of agitation are typically multifactorial and related to a combination of focal cerebral dysfunction (e.g., primary lesion to the frontal lobe, temporal lobe, prefrontal cortex, thalamus and/or limbic system), neurotransmitter dysregulation and impaired cognitive capacity to cope with and communicate about stressors. Agitation frequently manifests as an excess of motor and verbal behaviors that interfere with care or pose a risk to self or others. Predictors of agitation include PTA, impaired cognition and lower functional status. Exacerbating factors include more severe injury, premorbid history of substance abuse and presence of infection. Agitation has been associated with longer lengths of stay in both hospital and acute rehabilitation settings. Management is essential to permit effectiveness of therapies; assist community integration; and ensure the safety of the patient, caregivers and staff.

Agitation is a diagnosis of exclusion.<sup>11</sup> As such, other medical conditions (e.g., pain, infection, medication side effects), neurological causes (e.g., hydrocephalus, seizures, intracranial mass lesions) and psychiatric causes (e.g., underlying personality or mood disorders, sundowning, substance use) should first be ruled out with a complete blood count, complete metabolic panel, thyroid function tests, urinalysis or urine culture, urine toxicology, cerebrospinal fluid analysis, X-ray, CT, MRI; and/or electroencephalogram. Diagnosis may be aided by the Agitated Behavior Scale (ABS) and the Overt Aggression Scale (OAS).<sup>12</sup> The ABS is a measure of agitation specifically created for the brain injury population and is helpful for monitoring both patient recovery and medication effectiveness. It is scored 1–4 in 14 domains, including distractibility, impulsivity, cooperativeness, verbal and nonverbal behavior, aggression, wandering, restlessness and mood. A total score of < 21 is normal and > 35 indicates severe agitation. The OAS is an observational scale that allows recording of type, severity and frequency of various aggressive verbal and physical behaviors.

Shown below are the first-line management of agitation, which includes environmental and behavior modifications.

## **A. First-line Management of Agitation**

- Reduce external stimuli by minimizing light, noise and other distractions.
- Minimize use of restraints, tubes and lines.
- Staff and patient family members should frequently reorient the patient.
- Encourage proper sleep hygiene and sleep quality with a sleep schedule and bedtime routine and minimize use of electronics 30–60 minutes before bedtime.
- For restless patients, supervised ambulation may be helpful.
- Patients with aggression or behavioral issues should be managed by staff trained in de-escalation techniques.

Shown below are the pharmacological management strategies for agitation.

## **B. Pharmacological Management of Agitation**

- Use of beta blockers (propranolol), antiepileptic drugs (carbamazepine, valproic acid), antidepressants (SSRIs, tricyclic antidepressants, trazodone, lithium), antipsychotics (typical and atypical), neurostimulants (amantadine, methylphenidate) and anxiolytics (buspirone, benzodiazepines).<sup>13, 14</sup>
- Medications should be trialed one at a time, in the lowest starting dose available and with slow increases, while monitoring for medication effectiveness and side effects. Frequent reassessment is critical.
- Be mindful that the effective dose for medications commonly used in the general population may be lower in the brain injury population due to the sensitivity of the brain after injury (although traditional therapeutic doses may ultimately be necessary). Furthermore, the need for medication and medication dosing may change during the course of brain injury recovery.
- Propranolol has the best evidence for efficacy in treating agitation in the brain injury population with no adverse effect on motor or cognitive recovery. It has been shown to improve restlessness, disinhibition, anxiety and tremor. Consider a starting dose of 10 mg given three to four times a day with a maximum dose of 240 mg/day. Side effects include hypotension, bradycardia and lethargy. Propranolol should be considered a maintenance medication, to be given around the clock, and not on an as-needed basis for periods of acute agitation.
- For acute agitation, consider atypical antipsychotics such as quetiapine, ziprasidone, and olanzapine, again with low starting doses and given as needed. Side effects include sedation, extrapyramidal symptoms and dizziness. It is recommended to avoid use of typical antipsychotics (haloperidol) and benzodiazepines as they may hinder long-term motor and cognitive recovery, prolonged posttraumatic amnesia, and have risk of dependence and addiction.

## Sleep dysfunction

Sleep dysfunction after a traumatic or nontraumatic brain injury is a major contributor to daytime fatigue. As such, proper diagnosis and treatment permit effectiveness of therapies and aid long-term recovery. Sleep dysfunction is common after a brain injury, with a reported incidence of up to three times that of the general population.<sup>15,16</sup> Brain injury patients have been shown to have poorer sleep efficacy, shorter total sleep duration and greater wake after sleep onset time. Brain injury patients spend less time in Rapid eye movement (REM) sleep and have greater subjective sleepiness and poorer perceived sleep quality. This may be due to biochemical changes in the brain after injury and/or damage to the hypothalamus, brainstem, reticular activating system and basal forebrain. Evaluation of sleep disorders includes recording a sleep log and polysomnography. Technological advancements have permitted increased use of actigraphy (e.g., wearable watches to monitor sleep).

Prior to pharmacological intervention, consider other factors that may cause insomnia, including medications (SSRIs, neurostimulant use), pain, PTSD, anxiety, depression and external environmental factors or poor sleep hygiene. Those factors should be addressed first.

Shown below are the first-line pharmacological interventions for sleep dysfunction.

### ***A. First-line Pharmacological Interventions for Sleep Dysfunction***

- Use of melatonin and melatonin agonists (ramelteon), trazodone and mirtazapine.
- Medications should be trialed one at a time, in the lowest starting dose available, with slow increases, while monitoring for medication effectiveness and side effects. Frequent reassessment is critical.
- Use caution in older adults with all sedating medications, which may increase risk of nighttime falls.
- Other options that have been tried include tricyclic antidepressants (which may concurrently treat neuropathic pain and insomnia) and hypnotics (e.g., zolpidem, zopiclone, eszopiclone, zaleplon).
- Neurostimulant use for daytime arousal may facilitate nighttime sleepiness and improve sleep dysfunction. Stimulants for daytime wakefulness should typically be trialed only after attempts have been made to consolidate nighttime sleep. Modafinil, a wakefulness-promoting agent approved for the treatment of

narcolepsy and excessive daytime sleepiness due to obstructive sleep apnea, may be of use.

- Non-pharmacologic interventions may also be beneficial, including bright light therapy, cognitive behavioral therapy, stimulus control and cognitive restructuring.

## **Disorders of affect, mood and anxiety**

Affective dysregulation after a traumatic or nontraumatic brain injury occurs on a spectrum ranging from inappropriately flat affect to irritability, lability and pathologic laughing and crying. Individuals with TBI may have a diminished or absent ability to voluntarily control and regulate emotion. Both dysregulated emotion and the diminished ability to express emotion leads to increased burden for patients and caregivers.

Care should be taken to distinguish disturbances of affect from mood disorders wherever possible. Irritability, affective lability and pathologic laughing and crying can occur in the absence of associated mood disturbances. Individuals may report feeling that their outward expression of affect is disproportionate to, or altogether discordant with, subjective mood; that they have difficulty controlling emotional responses; or that family and friends misunderstand their emotional reactions.

Shown below are the first-line pharmacological interventions for posttraumatic affective dysregulation.

### ***A. First-line Pharmacological Interventions for Posttraumatic Affective Dysregulation***

- SSRIs are the first-line treatment for posttraumatic affective dysregulation and can be highly effective for this problem, typically at lower doses than are required for treatment of depression and with therapeutic benefit often seen within days of drug initiation.
- Tricyclic antidepressants (TCAs) can also be useful, though their greater side-effect profile warrants some additional caution.
- Nuedexta, a combination drug comprised of dextromethorphan and quinidine, is approved for the treatment of pseudobulbar affect (pathologic laughing and crying) and can be tried if SSRIs and TCAs are unsuccessful or contraindicated.

Apathy is similarly important to distinguish from depression, though these two disorders co-occur commonly. Neurostimulants (see below) may be beneficial for apathy in some individuals with TBI.

The two most common psychiatric disorders after TBI are posttraumatic depression and general anxiety disorder, often due to biochemical and organic changes after TBI (e.g., frontal lobe injury). Pre-injury anxiety, depression and substance abuse are leading risk factors for post-injury depression and anxiety disorder.<sup>17</sup> Diagnosing posttraumatic depression involves experiencing five or more of the following symptoms during a two-week period: depressed mood, decreased interest or pleasure, weight or appetite change, sleep disturbance, psychomotor slowing or agitation, fatigue, feeling of worthlessness, diminished concentration or cognition, and/or recurrent thoughts of death or suicidal ideation, and at least one of the symptoms should be either depressed mood or decreased interest or pleasure. Diagnosing general anxiety disorder involves experiencing excessive anxiety or worry, difficulty controlling worrying and at least three or more of the following symptoms: restlessness, easily fatigued, difficulty concentrating, irritability, muscle tension and/or sleep disturbance.

Posttraumatic depression and general anxiety disorder are often underdiagnosed (and undertreated). The gold standard for diagnosis is the Structured Clinical Interview for DSM-5 (SCID-5), which is a structured interview guide administered by clinicians or trained mental health professionals. Structured diagnostic interviews are superior to self-report measures — such as the Patient Health Questionnaire-9 (PHQ-9), Beck Depression Inventory-II (BDI-II) and Neurobehavioral Functioning Inventory (NFI) Depression Scale — but self-report measures may provide benefits in the domains of screening and symptom monitoring.

Shown below are the first-line pharmacological interventions for posttraumatic depression.

### ***A. First-line Pharmacological Interventions for Posttraumatic Depression***

- SSRIs such as sertraline and fluoxetine.<sup>18</sup>

Shown below are the second-line interventions for posttraumatic depression.

## ***B. Second-line Interventions for Posttraumatic Depression***

- Serotonin-norepinephrine reuptake inhibitors (SNRIs) and TCAs.
- Because these medications are also effective for pain, SNRIs and TCAs may be of particular utility when there are co-occurring headaches or other pain syndromes. Medications should be trialed one at a time, in the lowest starting dose available, with slow increases while monitoring for medication effectiveness and side effects.
- Cognitive behavioral therapy, problem-solving therapy and behavioral activation training have shown favorable outcomes for treating depression in the brain injury population.

## **Neurocognitive impairments**

There is growing evidence supporting the use of pharmacotherapy to improve cognitive function after traumatic and nontraumatic brain injury. Most approaches seek to enhance cerebral catecholaminergic or acetylcholinergic function.<sup>19</sup>

Table 10 shows the first-line pharmacological interventions for posttraumatic neurocognitive impairments.

### **Table 4: First-line Pharmacological Interventions for Posttraumatic Neurocognitive Impairments**

- The most commonly used medications are amantadine, a glutamate antagonist with dopamine-modulating properties approved for treatment of Parkinson's disease and drug-induced parkinsonism; methylphenidate, a stimulant approved for treatment of ADHD; and donepezil, an acetylcholinesterase inhibitor approved for treatment of Alzheimer's disease.

Amantadine is most often used for hypoarousal based on evidence for its benefit in patients with posttraumatic disorders of consciousness (e.g., minimally conscious or vegetative state),<sup>20</sup> though it can also be beneficial for attention and executive function in less severely impaired patients and may improve agitation and irritability in some. Amantadine dosing typically begins at 100mg/day in the morning and can be titrated as tolerated to a maximum of 400mg/day, divided into two doses (usually morning and midday to avoid sleep disruption). The most common side effects are orthostatic hypotension and nausea; psychosis is rare but can occur at high doses. Constipation and urinary retention are possible as a result of amantadine's mild anticholinergic

impact, and reduction of seizure threshold is a concern in individuals with tenuously controlled epilepsy. A dose reduction is required for renal insufficiency.

Methylphenidate has been shown to benefit attention, behavioral initiation and wakefulness in individuals with TBI. Dosing typically begins at 5mg twice daily, given in the morning and at midday. Common side effects include anxiety, irritability and insomnia; tachycardia is a consideration and may be a limiting factor, especially in individuals with dysautonomia. Methylphenidate has not been shown to reduce seizure threshold in TBI and is considered safe to use in patients with epilepsy.

Donepezil has been shown to benefit posttraumatic memory and attention impairments. Standard dosing is 5 to 10mg/day. Common side effects include headache, nausea, diarrhea and anorexia. These side effects may be minimized with nighttime administration, though dosing at night can be associated with vivid dreams.

While stimulants may appear to be a counterintuitive choice in cases in which there is significant irritability, motor restlessness or disinhibition, it is worth keeping in mind the possibility that these features may be driven by underlying difficulties with sustained attention or executive function that may be stimulant responsive. Psychiatrists will recognize this reasoning as analogous to the use of stimulants to treat hyperactivity in ADHD. In many instances, supporting sustained attention and executive function with judicious use of stimulants can substantially improve the injured individual's ability to participate meaningfully and appropriately in a wide variety of cognitive and social activities.

## **Medical contributors**

Recommendations for comprehensive management of posttraumatic medical and neurologic sequelae are beyond the scope of the present discussion. Awareness of these issues, however, may influence psychiatric management.

When depressed mood or anxiety is accompanied by headaches or chronic pain, SNRIs or TCAs may be beneficial. SSRIs can improve chronic subjective dizziness. Levetiracetam, used commonly for treatment of posttraumatic epilepsy, can contribute to depressed mood and irritability. When this is a consideration, individuals may benefit from switching (with guidance from neurology) to mood-stabilizing antiseizure medications such as valproic acid or oxcarbazepine, keeping in mind that while these agents may be preferable for mood, they are more likely than levetiracetam to contribute to sedation and ataxia. In general, whenever possible, we suggest close communication with



an individual's medical providers so that pharmacotherapy may be tailored to address psychiatric and nonpsychiatric issues in the most streamlined way possible.

## Summary

Having a foundational understanding of psychiatric issues and general principles of psychiatric and pharmacological interventions related to brain injury will allow the state brain injury program to engage their behavioral health partners more effectively. In addition, the modification tips can easily be passed onto psychiatrists in the field to assist them in achieving better outcomes for individuals with brain injury and co-occurring behavioral health concerns.

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