

## Guest Editorial

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# Neurorehabilitation through a Neuropsychiatric Lens

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## 1. Introduction

Few medical specialties have undergone as much substantive growth in as short a period of time as neurorehabilitation. With rapid advances in neurocritical care and an aging global population, the number of individuals living with chronic sequelae of neurological injury or disease has grown substantially in recent years (GBD 2017 Disease and Injury Incidence and Prevalence Collaborators, 2018). At the same time, modern neuroscience techniques have shed increasing light on the structure, function and remarkable resilience of the human nervous system. The result has been not just an expansion of the demand for neurorehabilitation, but a paradigm shift in our understanding of what neurorehabilitation can and should do, as modern concepts of neuroplasticity and cortical reorganization have displaced outdated notions of the adult brain as a static entity incapable of meaningful change at the neuronal level (Flanagan, 2010). Like the nervous system itself, the field of neuroreha-

bilitation derives strength from its flexibility, with a fundamentally adaptive approach capable of translating the constantly evolving world of neuroscientific knowledge into practical strategies for each unique patient.

The increasing integration of mental health care into neurorehabilitation practice is a prime example of the potential offered by this adaptive, inclusive strategy. Neurorehabilitation is a complex process, necessitating a multidisciplinary, individualized, and holistic approach to patient care in which the focus is often on decreasing the impact of symptoms rather than alleviating them completely. This transition—from the possibility of cure to that of managing and accepting a new way of living in the world—can be a major juncture in a patient's medical journey. Neurological injuries and neurodegenerative diseases can result in loss of physical independence, unfamiliar emotional experiences, and changes in social status and roles that can damage even the most robust self-esteem and strain healthy coping mechanisms to their limits. Such psychosocial challenges, common to the illness experience broadly, are often doubly painful in the case of brain-based disorders

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which, through their direct impact on neural circuitry, can rob patients of the very cognitive and emotional resources they might have otherwise drawn on to cope.

In this thematic issue of *NeuroRehabilitation*, we highlight this crucial component of the rehabilitation process: evaluation and management of the emotional and behavioral sequelae of neurological injury, collectively referred to as neuropsychiatric symptoms (NPS). These symptoms, which often receive less attention than the motor and cognitive impairments more commonly tracked by standard functional outcome measures, nevertheless may be the biggest drivers of neurorehabilitation potential. Depression, anxiety, apathy, agitation, and other non-cognitive NPS, if not properly identified and treated, can derail the most comprehensive neurorehabilitation plan.

Fortunately, the core tenets of neuropsychiatric care parallel those of neurorehabilitation in many ways. In neuropsychiatry as in neurorehabilitation, a good outcome often means improving quality of life and reducing distress even if some residual symptoms remain. Both disciplines appreciate the importance of multi-disciplinary care that actively engages the patient's support system and expects the patient to be an active participant in what is often an evolving treatment plan. Complex symptom constellations defying easy diagnostic categorization are the rule rather than the exception, and creative approaches are essential.

With the inevitable growth in demand for neurorehabilitation services, novel integrative models, innovative treatment techniques, and maximizing patient participation will be key (Viruega & Gaviria, 2022). The articles included in this issue collectively present a compelling argument for integrating principles of neuropsychiatric care more fully into standard neurorehabilitation practice. In this editorial, we highlight key insights related to neuropsychiatric symptom management in neurorehabilitation and commonalities amongst the articles included in this issue.

## 2. Multi-disciplinary care

By the nature of the syndromes treated, neuropsychiatry and neurorehabilitation are multi-disciplinary fields. As much as possible, treatment plans must be personalized and patient-centered with strong coordination of care. NPS must be properly identified and managed, often requiring collaboration across disciplines. An example is articulated in the included

review by Kalra et al. With the wide variety of clinical presentations and lack of consensus treatment guidelines for agitation following acute traumatic brain injury (TBI), Kalra et al. found the literature to support a need for often-complex management strategies involving multiple treatment team members. Both pharmacologic and non-pharmacologic approaches were found necessary and education around post-TBI agitation across disciplines, including nursing, occupational therapy, and physical therapy, was essential to improve outcomes. A second example is found in the included secondary data analysis by D'Alonzo et al. that found anxiety following sports-related concussion in adolescents to be significantly associated with post-concussive symptoms over time. General screening for NPS is included in many of the post-concussion symptom questionnaires (e.g., Rivermead) and neurorehabilitation teams must recognize that in some the emotionality considered part of post-concussion syndrome may represent a separate neuropsychiatric syndrome. Multi-disciplinary teams increase the chances that this will be recognized and appropriately treated.

The importance of this multi-disciplinary approach expands beyond the acute period. Through a case study of a 72-year-old patient with stroke, Krasna et al. describe the diagnostic clarification and improved prognosis obtained through integrated efforts between physiatry, neuropsychiatry, neurology, neuropsychology, and rehabilitation therapy. Additionally, this case report highlights the NPS of sleep disruption as a particularly important domain that spans disciplines. Perhaps most importantly, this case report demonstrates a key barrier for many neurorehabilitation programs, that of the great breadth of specialties required in the most complex cases. With virtual care taking a generational leap forward in the last few years, creation of "hub-and-spoke" programs, such as those designed after the Extension for Community Healthcare Outcomes (Project ECHO) (Arora et al., 2011; Sockalingam et al., 2018) are of great interest. These programs have the potential to give even the most remote patients and their providers access to quality specialists with those most sought after specialties able to cover multiple remote locations at once.

## 3. Complex symptom constellations

As hinted at above, patients requiring neurorehabilitation or neuropsychiatric care often present with

complex symptom constellations that do not neatly fit into a single diagnostic category. Although frustrating for many providers, the brain's ability to manifest such a wide and diverse array of symptoms is part of what makes formulating a rehabilitative treatment plan so rewarding. With ongoing advances in rehabilitative options, functional neurological disorders (FNDs) are a poignant example of the complexity of cases seen by neurorehabilitation and neuropsychiatric specialists (Mark, 2022). To make matters more complex, and as highlighted in the included cross-sectional cohort study by Jobin et al., FNDs are associated with persistent post-concussive syndrome, as well as levels of anxiety and depression in these cases. This combined presence of NPS, post-concussive syndrome, and FND, drives home the importance of thoughtful and thorough workup and diagnosis.

Examining the speech subtype of FND, the included article by Goldstein et al. showcases that untangling these complex presentations goes hand-in-hand with the point made above: multi-disciplinary teams are often required. In their case series, Goldstein et al. demonstrate that speech and language pathologists are invaluable team members in these cases, not only in terms of treatment, but also for clarification of diagnosis and setting patient and provider treatment expectations. Additionally, the included case report by Reisch et al. reveals what can go wrong when complex cases are not examined thoroughly enough or by the right specialists. A case of progressive supranuclear palsy frontal lobe cognitive subtype misdiagnosed as late-onset psychiatric disorder is presented. Misdiagnoses can occur for a number of reasons and Reisch et al. highlight the dangers of trying to make a patient's presentation fit nicely into a single diagnostic category, carrying forward prior diagnoses without re-formulating the case, and not involving the proper specialists. In both this case, as well as many others known by the editorial's authors, once the correct diagnosis is made in even the most complicated cases, ongoing treatment plans often change dramatically, and patients improve.

#### 4. Novel, creative treatments

Lastly, in both neurorehabilitation and neuropsychiatry, providers follow established guidelines and relevant literature when available. Unfortunately, it is rare that a given patient with his/her myriad of symptoms fits nicely into an evidence base. Providers must

think critically and creatively to craft treatment plans most likely to help a given patient. Novel trial design that combines pharmacotherapy with other forms of therapy (e.g., physiotherapy), rather than testing each individually, are pushing the field forward (Tamburin et al., 2019). In addition to pharmacotherapy, noninvasive brain stimulation therapies have gained attention as a way of augmenting treatment outcome during rehabilitation. In the included treatment trial by Mertens et al., transcranial direct current stimulation showed evidence of increased cognitive control in those undergoing executive function training when compared to this training alone. This focus on augmenting established, evidence-based neurorehabilitation practices, especially with noninvasive techniques, has the potential to become rapidly applicable and scalable.

#### 5. Conclusion

The field of neuropsychiatry and process of neurorehabilitation share many commonalities. Although this editorial was split into subheadings, these elements are inter-related. The complexity of the syndromes necessitates multi-disciplinary teams that think critically and creatively about treatment. Treatment of NPS should be viewed as an essential component of neurorehabilitation and given the potential for these symptoms to be overlooked, they often must be actively screened for. Luckily, providers in neurorehabilitation and neuropsychiatry have a shared optimism about meaningful quality of life being possible and worth aiming for in every patient, regardless of neurologic insult.

#### Declaration of interest

The authors have no interests to declare related to this work.

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