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ORIGINAL RESEARCH

Psychotropic Medication Use During Inpatient Rehabilitation for Traumatic Brain Injury

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Abstract

Objective: To describe psychotropic medication administration patterns during inpatient rehabilitation for traumatic brain injury (TBI) and their relation to patient preinjury and injury characteristics.

Design: Prospective observational cohort.

Setting: Multiple acute inpatient rehabilitation units or hospitals.

Participants: Individuals with TBI (N = 2130; complicated mild, moderate, or severe) admitted for inpatient rehabilitation.

Interventions: Not applicable.

Main Outcome Measures: Not applicable.

Results: Most frequently administered were narcotic analgesics (72% of sample), followed by antidepressants (67%), anticonvulsants (47%), anxiolytics (33%), hypnotics (30%), stimulants (28%), antipsychotics (25%), antiparkinson agents (25%), and miscellaneous psychotropics (18%). The psychotropic agents studied were administered to 95% of the sample, with 8.5% receiving only 1 and 31.8% receiving ≥6. Degree of psychotropic medication administration varied widely between sites. Univariate analyses indicated younger patients were more likely to receive anxiolytics, antidepressants, antiparkinson agents, stimulants, antipsychotics, and narcotic analgesics, whereas those older were more likely to receive anticonvulsants and miscellaneous psychotropics. Men were more likely to receive antipsychotics. All medication classes were less likely administered to Asians and more likely administered to those with more severe functional impairment. Use of anticonvulsants was associated with having seizures at some point during acute care or rehabilitation stays. Narcotic analgesics were more likely for those with history of drug abuse, history of anxiety and depression (premorbid or during acute care), and severe pain during rehabilitation. Psychotropic medication administration increased rather than decreased during the course of inpatient rehabilitation in each of the medication categories except for narcotics. This observation was also true for medication administration within admission functional levels (defined by cognitive FIM scores), except for those with higher admission FIM cognitive scores.

Conclusions: Many psychotropic medications are used during inpatient rehabilitation. In general, lower admission FIM cognitive score groups were administered more of the medications under investigation compared with those with higher cognitive function at admission. Considerable site variation existed regarding medications administered. The current investigation provides baseline data for future studies of effectiveness.

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Individuals with traumatic brain injury (TBI) frequently present to acute inpatient rehabilitation facilities with pain, hypoarousal, sleep dysregulation, behavioral dysregulation, spasticity, confusion, slowed cognitive processing, impaired memory, and affective disorders prompting prescription of multiple psychotropic

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medications.[1] Some of these medications are aimed at controlling behaviors to prevent harm and allow safer and more effective management of the patient (eg, use of stimulants, benzodiazepine, and antipsychotic agents to control agitation). Other medication uses are aimed at preventing comorbidities (eg, seizures), and some are aimed at enhancing function (eg, sleep medications, stimulants, antiparkinson agents).[2]

On admission and throughout the rehabilitation stay, the rehabilitation physician typically reviews prescribed medications to continually reassess the patient's needs. This includes discontinuing medications that no longer appear necessary or may cause an adverse response and adding other agents as deemed necessary. There is sparse literature to guide such clinical decision-making, and there are no medications that are currently approved by the U.S. Food and Drug Administration for the treatment of TBI. Additionally, the small body of published research is commonly limited by scientific rigor, such as lack of controlled trials, nonblinded prescribers, lack of information regarding injury, limited information on relevant data (eg, severity of injury, time of injury to treatment), mixed brain injury samples, and small sample sizes. Evidence of medication benefit and safety is usually extrapolated from therapeutic trials targeting common post-TBI conditions that also occur in other patient populations. An example would be the use of antipsychotic agents studied in patient populations other than brain injury and settings other than acute inpatient rehabilitation. There is a small but growing literature body regarding which pharmacologic agents may be helpful in the acute rehabilitation setting for persons who sustain TBI. For example, a randomized, placebo-controlled trial of 184 patients with TBI in rehabilitation in a vegetative state or minimally conscious state showed that amantadine was more effective than placebo in accelerating the rate of functional recovery.[3]

Various agents commonly used to manage the effects of TBI may cause adverse effects on health, function, and treatment efficiency.[4-10] For example, a retrospective review of 182 consecutive patients with moderate-to-severe TBI revealed commonly prescribed neuroleptics were associated with 7 days longer of posttraumatic amnesia (PTA).[1] In a study of individuals with TBI undergoing residential treatment, polypharmacy and use of anticholinergic medications were associated with an increased risk of falls.[11]

The degree to which psychotropic medications are used early after TBI during the course of inpatient rehabilitation is unknown. Use of psychotropic medications late after TBI was evaluated in a retrospective cohort study of 306 moderate-to-severe TBI survivors who had all been discharged from a TBI rehabilitation unit and were tracked up to 24 years postinjury. This study found that at follow-up, 58.9% were currently prescribed at least 1 medication. On average, persons with TBI were prescribed 2.64±2.14 medications (range, 1−12). The most prescribed medication types were anticonvulsants (25.8%), followed by antidepressants (8.2%), analgesics (8.2%), and anxiolytics (5.9%).[12]

Because of a lack of evidence on medication effects in patients with TBI, medication management during acute rehabilitation is driven largely by a patient's clinical presentation and physician subjective experience or preferences. Consequently, highly variable prescribing practices exist.[2,13] There is significant need to study physicians' medication administration patterns during acute TBI rehabilitation. Medication pattern data could then be used as the basis for future research. Specifically, such data could help identify commonly used types of medicine that would benefit from effectiveness analyses, inform research design (including sample size determination), and identify the degree to which sociodemographics, injury severity, and other potential confounds (eg, time from injury to rehabilitation, medical comorbidities, function, insomnia, agitation) would need to be addressed.

The Traumatic Brain Injury−Practice Based Evidence (TBI-PBE) project provides a unique opportunity to describe patterns of psychotropic medication administration at specialized inpatient brain injury rehabilitation units in the United States and Canada, including the medication agents prescribed, if medications were prescribed as the occasion arises (as needed) (PRN) or as scheduled, and timing of medication initiation and discontinuation across the course of rehabilitation. The TBI-PBE data also allow for evaluation of the relation between medication prescription and patient demographic, injury, medical, and function.

List of abbreviations:

AChEI	**acetylcholinesterase inhibitor**
CSI	**Comprehensive Severity Index**
PRN	**as the occasion arises (as needed)**
PTA	**posttraumatic amnesia**
RLOS	**rehabilitation length of stay**
SARI	**serotonin antagonist and reuptake inhibitor**
TBI	**traumatic brain injury**
TBI-PBE	**Traumatic Brain Injury−Practice Based Evidence**

Methods

Study design, study sites, and participants

The TBI-PBE Project is a 5-year, multicenter investigation of the TBI inpatient rehabilitation process.[14] A total of 2130 patients who received acute inpatient rehabilitation were enrolled in the project and used for the current study. The project sites included 10 inpatient rehabilitation facilities: 9 in the United States and 1 in Canada. The study was approved by the local institutional review board at each study site. Inclusion criteria included the following: participant age of ≥14 years, informed consent from participant or their parent/guardian, and admission to the facility's brain injury unit for initial rehabilitation after TBI.

Variables and data collection

Collection and classification of medications

Medication data were collected either through manual chart abstraction or electronic data download, depending on the site and availability and dependability of electronic data. Only those medications actually administered were recorded. Medications ordered but not given for any reason were not recorded. As customary during inpatient rehabilitation, medications were administered and recorded by nursing staff. Also per routine practice, a rehabilitation physician wrote the admission medication orders within minutes to hours of the patient's arrival to the inpatient rehabilitation unit and performed history and physical examination within 24 hours.

Common drug classification schemes vary, based on factors such as the chemical type of the active ingredient (eg, benzodiazepines), presumed mechanisms of action (eg, serotonin reuptake