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The diagnostic criteria and structure of catatonia

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ABSTRACT

Background: The classification of catatonia has fluctuated and underwent recent changes in DSM-5. The current study examines the prevalence of catatonia signs, estimates the utility of diagnostic features, identifies core catatonia signs, and explores their underlying structure.

Method: We screened 339 acutely ill medical and psychiatric patients with the Bush Francis Catatonia Rating Scale (BFCRS). We examined prevalence and severity of catatonia signs and compared BFCRS, DSM-IV and DSM-5 diagnoses. We used principal component analysis (PCA) to examine the factorial validity of catatonia and item response theory (IRT) to estimate each sign's utility and reliability.

Results: Out of the 339 patients, 300 were diagnosed with catatonia using the BFCRS and 232 catatonia diagnoses were validated by the treating provider based on selection for treatment with benzodiazepines or electroconvulsive therapy. Of the 232 validated catatonia cases, 211 (91%) met DSM-IV criteria but only 170 (73%) met DSM-5 criteria for catatonia. Staring was the most prevalent catatonia sign. PCA identified three components, interpretable as "Increased, Abnormal and Decreased Psychomotor Activity," although 63% of the variance was unexplained. IRT showed that Excitement, Waxy Flexibility and Immobility/Stupor were the best indicators of each factor. The BFCRS had many redundant items and as a whole had low reliability at low severity of catatonia, but good reliability at moderate–high severity of catatonia.

Conclusions: The structure of catatonia remains to be discovered.

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1. Introduction

In 1874, Karl Kahlbaum described catatonia in patients who suffered from severe psychotic, mood and medical conditions (Kahlbaum, 1874). Kraepelin and Bleuler, however, redefined catatonia as a subtype of dementia praecox (1896) (Kraepelin, 1919) and schizophrenia (1911) (Bleuler, 2010). Clinicians followed their redefinition throughout most of the 20th century, with a few notable exceptions (Morrison, 1973, 1974a,b, 1975; Abrams and Taylor, 1976, 1977; Taylor and Abrams, 1977; Abrams et al., 1979). The diagnostic categories for catatonia were broadened in DSM-III-R (catatonia was added as a specifier for mood disorders) and DSM-IV (catatonia resulting from a general medical condition was added) (AP, 2000). DSM-5 introduced several changes in the classification of catatonia, intended to improve recognition, treatment and research (Taylor and Fink, 2003; Fink et al.,

2010; Francis et al., 2010; Heckers et al., 2010; Rosebush and Mazurek, 2010; Braff et al., 2013; Tandon et al., 2013).

Despite the changes in nosology, it is unclear which and how many signs define a case of catatonia. More than 40 clinical signs of catatonia have been described and at least seven scales for the assessment of catatonia have been proposed (Taylor and Fink, 2003). The preferred rating scale for routine catatonia assessment is the 23-item Bush-Francis Catatonia Rating Scale (BFCRS) because of reports of its validity and reliability, ease of administration and since cases can be identified based on the presence of 2 or more items of the first 14 items (Sienaert et al., 2011). In contrast, the DSM-5 criteria require a minimum of 3 out of 12 signs for the diagnosis of catatonia. How these differences in the definition of caseness affect the recognition of catatonia is currently unknown.

Previous studies have identified up to six dimensions of catatonia (Abrams et al., 1979; McKenna et al., 1991; Starkstein et al., 1996; Oulis et al., 1997; Northoff et al., 1999; Peralta et al., 1999, 2010; Peralta and Cuesta, 2001; Kruger et al., 2003; Ungvari et al., 2007). Except for one study (Oulis et al., 1997), the factors stupor and excitement are a common finding, although the naming and exact grouping of signs differ.

Here we report the analysis of a diverse clinical sample of acutely ill medical and psychiatric patients with catatonia. We compare diagnosis

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rates based on BFCRS, DSM-IV and DSM-5, study the factorial structure of catatonia and estimate the reliability of the catatonia signs in the BFCRS.

2. Methods

2.1. Registry

Patients were identified using a retrospective chart review. We included all patients with a completed Bush Francis Catatonia Rating Scale (BFCRS) assessment in the electronic medical record system at Vanderbilt University Medical Center between 06/18/2009 and 06/16/2012. All catatonia assessments were performed by psychiatrists who had experience in assessing catatonia and were trained in the use of the BFCRS. We identified 339 patients with a BFCRS assessment performed in one of four settings: general medical hospital, emergency room, psychiatric hospital or outpatient psychiatry clinic. If a patient was represented with more than one rating scale, only the first assessment performed by the most senior evaluator was included for analysis. All 339 patients were screened for catatonia with the 14-item Bush-Francis Catatonia Screening Instrument (BFCSI). 300 patients (88.5%) scored for 2 or more items and were assessed with the full 23-item BFCRS (see Supplemental Fig. 1). Careful case-by-case review of all available medical records was undertaken to determine the underlying medical and psychiatric diagnoses (see Supplemental Fig. 2). Additionally, response to treatment with benzodiazepines and ECT was scored as “substantially improved”, “partially improved” or “not improved”, as documented in the notes by the treating physician.

2.2. BFCSI and BFCRS

The Bush Francis Catatonia Rating Scale (BFCRS) is the most widely used catatonia rating scale, given its ease of use and high inter-rater reliability and validity (Sienert et al., 2011). The scale consists of 23 signs, with the first 14 items constituting the Bush Francis Catatonia Screening Instrument (BFCSI). The definition of catatonia proposed by Bush et al. (1996a) is the presence of two or more signs on the BFCSI, regardless of severity (Bush et al., 1996a,b). Sixteen items are rated on a severity scale 0 (absent) through 3 (e.g. constant), while the other six items are rated 0 (absent) and 3 (present). The total BFCRS score is the sum of the responses to all 23 items.

2.3. Catatonia diagnoses

The presence of 2 or more BFCSI signs on examination meets the standard for a diagnosis of catatonia (Bush et al., 1996a,b). Within the 300 patients who met the BFCSI diagnosis of catatonia, we identified a subset of 232 patients meeting the following 3 criteria: 1) at least 2 items on BFCSI, 2) clinical diagnosis of catatonia by treating provider and 3) selection for treatment with a benzodiazepine or ECT. We will focus our report on this subset of 232 catatonia patients validated by treatment. To determine caseness for catatonia we calculated the number of positive items on the BFCSI for each subject and identified which signs, if removed, lowered the sum below 2. DSM-IV and DSM-5 diagnoses of catatonia were established by applying the respective diagnostic criteria A (APA, 2013) to all cases with 2 or more BFCSI signs. To ascertain sensitivity of diagnostic criteria we examined the severity and prevalence of catatonic signs, catatonia caseness, the effect of treatment and the potential confounding effect of psychopharmacological treatment history.

2.4. Psychometric analysis

Data analysis proceeded in three steps. Step one consisted of computing item (i.e., sign) frequencies. In step two, principal components analysis (PCA) (Kruskal and Wish, 1978; Gorsuch, 1993;

Tabachnick and Fidell, 2001) was computed to identify the number of dimensions that underlie the BFCRS. To identify the most parsimonious number of dimensions, a scree plot was generated, and results from 1000 simulations of equal data size and symptoms were superimposed on the graph. This was supplemented by considerations for reliability and interpretability. Promax rotation allows for correlation between dimensions and was used to rotate the structural coefficients to interpret the dimensions (Gorsuch, 1993). The cut-off value for item loadings was 0.40. In the third step, item response theory (IRT) analysis was computed with Latent Trait Models (LTM) (Rizopoulos, 2006) (Levine et al., 2011). IRT quantifies the disparity between clinical ratings and the expression of the underlying (latent) catatonia phenotype.

3. Results

3.1. Demographic and clinical characteristics

Patients were assessed with the BFCSI in a psychiatric hospital (n = 218, 64.3%), a tertiary medical center (n = 66, 19.5%), an emergency room (n = 44, 13.0%) and a psychiatry outpatient clinic (n = 11, 3.2%) (Supplemental Table 1).

3.2. Severity and prevalence of catatonia signs

In the group of 339 patients screened, we observed a mean of 5.27 (2.39 SD) signs using the BFCSI and 7.58 (3.51 SD) signs using the full BFCRS. Staring was the most prevalent sign (observed in 70.5% of all patients) and combativeness was the least frequently reported sign (observed in 10.9% of all patients) (Fig. 1A). 20 patients (8.6% of all patients) showed only 2 signs, i.e., the minimum number of signs for caseness (see Fig. 1B). For the 232 validated cases of catatonia, the mean BFCSI and BFCRS scores were 5.60 ± 2.34 and 8.08 ± 3.45 respectively.

3.3. Catatonia caseness

We assessed how often cases would fail to meet the criteria for catatonia if an item was removed from the criterion set for the BFCSI, DSM-IV and DSM-5 (Fig. 1C). Staring had the greatest impact on caseness, followed by immobility/stupor, excitement, rigidity and mutism. Grimacing, echopraxia/echolalia and waxy flexibility had no effect on caseness. Of the 232 patients with validated catatonia, 211 (90.95%) met DSM-IV criteria but only 170 (73.28%) met DSM-5 criteria for catatonia.

3.4. Effect of treatment with benzodiazepines and ECT

Of the 232 cases selected for treatment with benzodiazepines or ECT, 7 (3%) patients refused the recommended treatment. The average effective dose of lorazepam required for treatment response was 5.81 mg per day (SD 4.7). 6 patients (2.6%) were treated with clonazepam, requiring an average dose of 2.8 mg per day until clinical improvement. Of the 225 patients treated with a benzodiazepine, 191 (84.9%) substantially improved, 25 (11.1%) partially improved, 9 (3.1%) did not respond to treatment with a benzodiazepine.

45 (19.4%) patients required treatment with ECT, generally due to the presence of severe catatonia (autonomic abnormalities, refusal to eat or drink), or incomplete response to benzodiazepines. 42 patients (93.3% of those who received ECT) substantially improved, while 3 patients (6.7%) partially improved. The average number of ECT sessions required during induction for treatment remission was 8.4 (SD 5.6). 1 patient was already undergoing maintenance ECT at the time catatonia was assessed.

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