Journal of Psychosomatic Research 72 (2012) 236–241

Contents lists available at SciVerse ScienceDirect

Journal of Psychosomatic Research

A longitudinal study of motor subtypes in delirium: Frequency and stability during episodes

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ARTICLE INFO

Article history:
Received 25 July 2011
Received in revised form 11 October 2011
Accepted 23 November 2011

Keywords:
Delirium
Activity
Motor
Subtypes
Phenomenology
Longitudinal

ABSTRACT

Objective: Motor-defined subtypes are a promising means of identifying clinically relevant patient subgroups but little is known about their course and stability during a delirium episode.
Methods: We assessed 100 consecutive adult palliative care patients with DSM-IV delirium twice weekly during their episodes using the Delirium Motor Subtype Scale (DMSS), Delirium Rating Scale-Revised-98 (DRS-R98) and Cognitive Test for Delirium (CTD). DMSS subtypes were assigned for each assessment and analysed for stability within patients during episodes.
Results: Across all assessments (n = 303; mean 3 per patient, range 2–9), subtype occurrence was hypoactive (35%), mixed (26%), hyperactive (15%) and no subtype (24%). "No subtype" was associated with significantly lower DRS-R98 severity scores, of which 80% were subsyndromal, whereas mixed subtype assessments were the most impaired on the DRS-R98 and CTD. Subtypes were stable within delirium episodes in 62% of patients: 29% hypoactive, 18% mixed, 10% hyperactive and 6% no-subtype. The DRS-R98 noncognitive subscale scores differed across groups whereas cognitive subscale scores did not ($p<0.001$).
Conclusions: We conclude that motor subtypes occur in nearly all patients with full syndromal delirium and are often stable during an episode. Subtypes exhibited comparable levels of cognitive impairment but differed in non-cognitive symptoms, supporting the importance of cognitive testing to detect delirium in less overt cases.
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Introduction

Although delirium is considered a unitary syndrome with prevalent core symptoms, it is a heterogeneous condition for causation and outcome, especially across the major age ranges. Those with hyperactivity are more readily recognised but this may contribute to poorer outcomes among hypoactive cases. Meagher [1] reviewed the evidence that delirium patients described according to motor/psychomotor subtypes are reported to be associated with differences for prognostic parameters. However much of the literature utilised different subtype criteria and symptom severity thresholds such that subtype incidence and outcomes are inconsistent across studies [2]. Notably, referral samples are usually confounded by significant under-recognition of hypoactive patients which affects the accuracy of study results. Drug treatment response differences for motor subtypes have been addressed in only a few studies [3–6] but differential psychopharmacology has not yet been clearly delineated.

Moreover, interpretation of the existing literature is hindered by a lack of consistency in methodology. Motor subtype checklists include many nonspecific behavioural symptoms, may only require one symptom for a subtype to be present (and that might not be specifically motor in nature), and have not been validated against controls or objective motor measures. Motor activity items from rating scales have also been used in some studies and tend to focus on pure motor disturbances in their definitions. Meagher et al. [7] validated a new motor subtype scale, the Delirium Motor Subtype Scale (DMSS), focused only on motor features and which differentiated delirious from nondelirious subjects. Moreover, subsequent work has indicated that DMSS defined subtypes match objective (electronic) measures of motion [8]. Subtypes identified cross-sectionally using the DMSS had comparable neuropsychological profiles but differed for noncognitive symptoms of delirium [9]. Furthermore, preliminary

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doi:10.1016/j.jpsychores.2011.11.013

work has suggested that the DMSS has predictive validity for outcome in delirium [7]. No other delirium subtype method has undergone such rigorous validation.

Most phenomenological research describes cross-sectional assessment of delirium and therefore little is known about the stability of motor symptoms and subtypes over the course of a delirium episode within an individual [1]. To fully capture the character of the syndrome, which includes fluctuations in severity over a 24-hour period, phenomenological issues must be explored with longitudinal studies that assess clinical profile throughout the duration of an episode. The increased interest in longitudinal study of delirium has highlighted that the course of delirium is much less reversible than traditional concepts have emphasised and that a significant number of patients experience persistent symptoms that can progress to long-term cognitive impairment [10] although the relevance of factors such as variations in underlying aetiology, ageing, genetic factors and treatment settings in shaping illness course over time remains uncertain [11].

We describe 100 consecutive cases of DSM-IV diagnosed delirium occurring in a palliative care setting that were assessed for motor profile, cognition and delirium phenomenology longitudinally for up to 9 visits (6 weeks) during the course of their delirium episodes. The specific aim of this report was to explore how motor profile (DMSS subtype) evolves during delirium episodes and relates to delirium syndromal severity using well-validated tools. In particular, we wished to determine [1] the intra-individual stability of motor subtype classification [2] whether the frequency of motor subtypes changes with increased duration of delirium (e.g. whether more persistent illness involves greater prominence of hypoactive profile [3]) the extent to which mixed subtype overlaps over time with hypoactive and hyperactive subtypes. A separate report addresses the relationship between motor subtypes and aetiology, medication exposure and prognosis [12].

Methods

Subjects and design

We conducted a prospective, longitudinal study of phenomenological profile in consecutive adult cases of delirium occurring in patients with cancer diagnoses receiving care at Milford Hospice palliative care inpatient service in Limerick, Ireland. Over a two year period between 2006 and 2008, cases with altered mental state were identified on daily rounds by the palliative care medical team and consecutively referred for delirium diagnosis according to DSM-IV criteria [13] by the research team (ML, DM). Assessments were conducted by trained, highly experienced raters in the use of the Delirium Rating Scale-Revised-98 (DRS-R98) [14] and Cognitive Test for Delirium (CTD) [15] (ML or DM) and to further enhance interrater reliability, difficult ratings were discussed and rated by consensus between both raters. The DMSS ratings were conducted by key nursing staff familiar with the patients motor activity profile and rated according to profile during the previous 72 h.

Dementia was defined as the presence of persistent cognitive impairment for at least 6 months prior to the assessment and per DSM-IV criteria [13] based on all available information at the time of assessment including clinical case notes and collateral history from family and/or carers.

The duration of delirium symptoms at the point of assessment was assessed using all available information, including interviewing a key caregiver/family member to ascertain when the first evidence of a change in mental state suggestive of delirium occurred.

Each case was then assessed twice weekly for up to 3 weeks and then weekly, or until either discontinuation from the study or resolution of the delirium episode occurred. The DRS-R98 was administered just prior to the CTD. The DRS-R98 rated the preceding 72 hour period (or week for visits after the initial 3 weeks) whereas the CTD measured cognition at the time of its administration. CTD responses were not used to rate DRS-R98 items. Both the DRS-R98 and the CTD are well validated instruments, highly structured and anchored for rating and scoring.

Assessments

Demographic data, medical diagnoses, and medication were collected at the time of the baseline evaluation. All available information from medical records and, where possible, collateral history was used. Nursing staff were interviewed to assist rating of symptoms over each previous 72 hour-period.

The *Delirium Rating Scale-Revised-98* [DRS-R98] [14] is designed for broad phenomenological assessment of delirium. It is a 16-item scale with 13 severity and 3 diagnostic items with high interrater reliability, sensitivity and specificity for detecting delirium in mixed neuropsychiatric and other hospital populations. Although the DRS-R98 is most frequently used to assess phenomenological profile over 24 hour periods, it can also be used to rate more prolonged periods (e.g. 72 h). Each item is rated 0 (absent/normal) to 3 (severe impairment) with descriptions anchoring each severity level. Severity scale scores range from 0 to 39 with higher scores indicating more severe delirium. Delirium typically involves scores above 15 points (severity scale) or 18 points (total scale) when dementia is in the differential diagnosis. For determination of item frequencies in this study, any item score ≥ 1 was considered as being "present". DRS-R98 items can be divided into cognitive (#9–13) and non-cognitive (#1–8) subscales based on construct validity. Motor activity profile was also assessed according to scores on item #7 (agitation) and item #8 (retardation) of the DRS-R98.

The *Cognitive Test for Delirium* [CTD] [15] was specifically designed to assess hospitalised delirium patients, in particular those who are intubated or unable to speak or write. It assesses five neuropsychological domains (orientation, attention, memory, comprehension, and vigilance) emphasising nonverbal (visual and auditory) modalities. Tests are components of standardised and widely used neuropsychological tests. Each individual domain is scored from 0 to 6 by 2 point increments, except for comprehension (single point increments). Total scores range between 0 and 30 with higher scores indicating better cognitive function and scores of less than 19 consistent with delirium. It reliably differentiates delirium from other neuropsychiatric conditions including dementia, schizophrenia and depression [15].

The *Delirium Motor Subtype Scale* (DMSS) [7] is a scale using 11 motor items derived from items used in previous motor subtyping methods but with relative specificity for delirium and demonstrated correlation with objective measures of motor behaviour, including electronic motion analysis [8]. It can be rated by any healthcare professional who is familiar with patient behaviour and can be used to rate the previous 24 h or more. Each of the eleven symptoms (4 hyperactive and 7 hypoactive features) is rated as present or absent where at least 2 symptoms must be present from either the hyperactive or hypoactive list to meet subtype criteria. Patients meeting both hyperactive and hypoactive criteria are deemed mixed subtype while those meeting neither criteria are deemed 'no subtype'. The expression of subtypes over the course of delirium was determined according to subtype allocation for assessments that were of full syndromal intensity according to DRS-R98 cutoff scores and divided into those with a single subtype throughout (stable subtype course) vs. those with more than one subtype documented (variable subtype course).

Informed consent

The procedures and rationale for the study were explained to all patients but because many patients had cognitive impairment at entry into the study it was presumed that most were not capable of giving informed written consent. Because of the non-invasive nature

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