BMJ Neurology Open

# Treatment outcomes in the inpatient management of severe functional neurological disorder: a retrospective cohort study

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**To cite:** Saunders C, Bawa H, Aslanyan D, *et al*. Treatment outcomes in the inpatient management of severe functional neurological disorder: a retrospective cohort study. *BMJ Neurology Open* 2024;**6**:e000675. doi:10.1136/bmjno-2024-000675

► Additional supplemental material is published online only. To view, please visit the journal online (https://doi.org/10.1136/bmjno-2024-000675).

Received 07 February 2024
Accepted 10 June 2024



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## ABSTRACT

**Background** Functional neurological disorder (FND) is a heterogeneous condition; severe forms can be disabling. Multidisciplinary treatment and rehabilitation are recommended for severe FND, but there remains a lack of evidence for its efficacy and lack of understanding of the predictors and components of recovery.

**Methods** We report clinical outcome data for an inpatient cohort with severe FND. Clinical Global Impression Improvement with treatment is the primary outcome measure. Admission and discharge measures (Euroqol quality of life measures, Beck Depression Inventory, Spielberger Trait Anxiety Inventory, Cambridge Depersonalisation Scale, Illness Perception Questionnaire (Revised) and Functional Mobility Scale) are reported as secondary outcomes.

**Results** We describe an FND cohort (n=52) with chronic illness (mean symptom duration 9.7 years). At admission, there were clinically relevant levels of depression, anxiety and depersonalisation derealisation. At the time of discharge, most (43/52) patients' global condition had improved. Measures of mobility, depression and quality of life also significantly improved while at discharge, symptoms were experienced as more understandable and less distressing than at admission. An admission measure of patient confidence in treatment was predictive of eventual clinical outcome.

**Conclusions** The most frequent outcome of inpatient rehabilitation is global improvement, even when symptoms are chronic and severe, reflected in measurable changes in both physical and psychological functioning. Significant levels of depersonalisation derealisation seen in this patient group suggest that routine enquiry into such experiences could help personalise FND treatment approaches. Patient confidence in treatment is key in determining clinical outcomes.

### WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Functional neurological disorder (FND) is a severe disabling condition and treatment outcomes are often poor. Research on inpatient treatment of severe FND is limited.

### WHAT THIS STUDY ADDS

⇒ Evidence of significant positive outcomes in chronic severe FND with intensive inpatient rehabilitation, with significant impact on mobility, mood, medication use and quality of life, with additional data on previously unreported factors associated with good clinical outcomes.

### HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ These data show that specialist multidisciplinary treatment can be effective in severe FND, so should be more widely available, and suggest that symptoms of depersonalisation, and patient beliefs about treatment, should be routinely assessed in this patient group.

## INTRODUCTION

Functional neurological disorder (FND) is characterised by disruption of motor, sensory or cognitive functions, in patterns that are not consistent with recognised structural disease (or damage) of the nervous system. FND is common, and symptoms cause disability comparable to that associated with other severe neurological diseases.[1] In severe FND, patients can become restricted to a bed or wheelchair and reliant on care. Globally, there is limited availability of specialist treatment for patients with FND.[2] Published outcomes of inpatient treatment of severe FND are sparse and are predominantly observational studies of small clinical cohorts,[3] such that there is limited evidence to support inpatient, multidisciplinary intervention in chronic, severe FND.[4–6]

This study aims to extend knowledge regarding the treatment of severe FND by describing the characteristics and treatment outcomes of patients consecutively admitted to a specialist unit offering multidisciplinary rehabilitation informed by a biopsychosocial treatment model. We also examine whether data collected at time of admission

had predictive value in terms of eventual treatment outcomes.

## METHODS

### Treatment intervention

Inpatient rehabilitative treatment at the Lishman Unit, a tertiary National Health Service (NHS) England specialist neurorehabilitation unit within South London and Maudsley (SLaM) NHS Trust. The early stages of treatment focus on formulation, psychoeducation and building of therapeutic relationships. Patients take an active role in setting treatment goals and engage in the inpatient programme to work towards these. Patient timetables are personalised and include individual therapy sessions (clinical psychology, physiotherapy and occupational therapy), regular medical review and goalsetting meetings, therapeutic activity groups and social work input where relevant. Psychological approaches are broadly in line with cognitive–behavioural therapy, although dynamic or interpersonal aspects may be incorporated. Occupational therapists work with activity planning and management, relaxation strategies and helping patients build confidence and life skills.[7] Physiotherapy focuses on retraining movement, attentional strategies, education and an individualised exercise/treatment plan.[8] There is a clinical emphasis on slow withdrawal of certain medications, particularly opiates or benzodiazepines, that might hinder engagement with rehab through their cognitive effects. Patients also take part in daily community meetings and are offered other group activities, for example, gardening, relaxation and games. Discharge is usually a graded process with patients spending increasing amounts of time on home leave and engaging with family and/or carers, to maximise the chance that therapeutic progress made as an inpatient can be transferred to the home environment and sustained postdischarge.

### Inclusion criteria

All patients admitted to the unit for treatment of FND between May 2017 and December 2020 were eligible for inclusion in the present study. The majority of patients are referred from the community and are complex cases in whom outpatient-based treatment is impractical or has already been attempted without success.

### Data collection, variables and measures

The primary clinical outcome measure is the Clinical Global Impression improvement scale (CGI-I), a measure of overall clinical change at the time of discharge. Secondary outcomes are measures of quality of life, functional mobility, depression, anxiety, depersonalisation and illness perception. All data were extracted using an anonymised version of the SLaM NHS Trust electronic notes system, which has been designed for research (Clinical Record Interactive Search, CRIS).[9] Clinical variables were extracted using algorithmic search strategies where available (eg, demographics, length of stay, comorbidities and medications), otherwise by manually searching anonymised patient notes. Somatic symptoms were self-reported on admission in relation to the previous 14 days. Recorded adverse life events were extracted from anonymised clinical notes through manual search and coded by authors CS and NM, psychiatrists with treating knowledge of the cohort. Recorded lifetime history of abuse was coded as sexual, physical or complex, this last denoting cases reporting extensive developmental abuse in multiple domains. Stressful and traumatic life events reported in the year prior to symptom onset were also coded. 'General stress' was coded when significant and unusual stress in areas such as finances, work or relationships was recorded in the year prior to symptom onset. 'Stressful event' was coded when a specific event perceived by the patient as significant was reported (eg, episodes of poor health requiring inpatient treatment, assaults, accidents and significant loss events). Data related to medication use were extracted from clinical notes by use of algorithmic search strategy and corroborated through manual search of anonymised electronic notes (CS). See online supplemental table 1 for details on how variables were defined and data extracted.

The following measures were completed by patients at admission and discharge: Beck Depression Inventory (BDI-II),[10] Spielberger Trait Anxiety Inventory (STAI),[11] EuroQol 5-dimension 5-level scale (EQ-5D-5L) and EuroQol Visual Analogue Scale (EQVAS) (EuroQol quality of life measures),[12] Cambridge Depersonalisation Scale (CDS),[13] Revised Illness Perception Questionnaire (IPQ-R).[14] Physiotherapy measures recorded at admission and discharge were Berg-Balance Scale,[15] 10 m walk test[16] and the Timed Up & Go.[17] Due to considerable variation in the ability to complete these measures (eg, high number of wheelchair-bound patients), they were converted retrospectively by a physiotherapist with knowledge of the cases (FC) to the Functional Mobility Scale (FMS),[18] a measure of physical mobility that has previously been adapted as an FND outcome measure.[19 20]

The primary outcome measure, the CGI-I, has been recommended as a pragmatic measure of clinical outcomes in FND.[21] The score ranges from 1 to 7 (1=very much improved, 2=much improved, 3=minimally improved, 4=no change, 5=minimally worse, 6=much worse 7=very much worse).[22] Scores were assigned at the end of treatment by two of the treating clinicians (NM and HJ).

Changes in the EQ-5D-5L and EQVAS, FMS, BDI-II, STAI, CDS and IPQ, plus subscales where relevant, are presented as secondary outcome measures.

### Statistical analysis

All extracted data were compiled in anonymised form and analysed in SPSS (V.29). Demographic and clinical characteristics and the primary outcome measure are presented using frequencies (categorical or ordinal) or median and range (continuous, non-parametric). Group differences in admission and discharge measures (secondary outcomes)

**Table 1** Description of cohort at admission (n=52)

| | | |
|---|---|---|
| Gender | | |
| Male | n (%) | 17 (32%) |
| Female | n (%) | 34 (65%) |
| Non-binary* | n (%) | 1 (2%) |
| Age | | |
| Years | Mean, (SD), range | 40 (14), 21–82 |
| Duration of symptoms | | |
| Years | Mean (SD), range | 9.7 (8.83) 1–40 |
| Level of care at admission | | |
| Minimal | n (%) | 11 (21%) |
| Independent but receiving disability benefits and using mobility aids | n (%) | 14 (27%) |
| Dependent on care in home setting | n (%) | 19 (37%) |
| Receiving 24 hours formal care (eg, nursing home/hospital care) | n (%) | 8 (15%) |
| Comorbidities | | |
| None | n (%) | 10 (19%) |
| Major psychiatric comorbidity alone | n (%) | 4 (7.5%) |
| Neurological comorbidity alone | n (%) | 7 (13%) |
| Psychiatric and medical comorbidity | n (%) | 10 (19%) |
| Neurological and autoimmune comorbidity | n (%) | 4 (7.5%) |
| Other major medical comorbidities† | n (%) | 17 (33%) |
| Primary functional symptom | | |
| Mixed functional symptoms | n (%) | 31 (60%) |
| Non-epileptic seizures | n (%) | 9 (17%) |
| Motor symptom | n (%) | 7 (14%) |
| Cognitive symptoms | n (%) | 3 (6%) |
| Extreme fatigue | n (%) | 2 (4%) |
| Systemic symptoms reported at admission (Y/N) | | |
| Fatigue | n (% yes) | 46 (94%) |
| Pain | n (% yes) | 47 (96%) |
| Headaches | n (% yes) | 46 (88%) |
| Sleep disturbance | n (% yes) | 44 (90%) |
| Bowel disturbances | n (% yes) | 38 (78%) |
| Nausea | n (% yes) | 37 (76%) |
| Dizziness | n (% yes) | 41 (84%) |
| Breathlessness | n (% yes) | 35 (71%) |

*Assigned female at birth.
†Not neurological or psychiatric.

were tested using Wilcoxon signed rank tests. CDS data were allocated to subgroups defined by history of childhood abuse and significant adverse life events, to explore the relationship between trauma and dissociation. A Spearman's correlation matrix was computed to explore associations of variables on admission with each other or with the primary outcome measure (CGI-I). Significant correlations between admission variables and CGI-I were further tested through logistic regression analysis. Missing values were excluded listwise (logistic regression) or pairwise (related samples tests/correlation). Where frequencies are described, percentages are based on the number of non-missing values. We followed the reporting guideline for cohort studies according to the Strengthening the Reporting of Observational Studies in Epidemiology.[23]

## RESULTS

54 consecutive patients admitted for treatment of FND between May 2017 and December 2020 were identified

through admissions records. Two patients admitted during the study period were excluded from the analysis: one had been rediagnosed during admission with an organic pathology which explained their symptoms and one withdrew their consent. Mean length of stay was 19.4 weeks (SD 13.7) (median 16, range 3–76). Length of stay was affected by a positive skew caused by 3 'long stay' patients (above 40 weeks) whose discharge was delayed due to difficulties finding appropriate postdischarge accommodation.

Of the 52 individuals included in analysis, 17 were male, 34 were female and 1 was identified as non-binary (table 1). Mean age was 40 years (range 21–82). In general, the cohort had long-standing illness. Mean duration of symptoms at time of admission was 9.7 years (range 1–40). Half of the patients were dependent on formal or informal care for assistance with activities of daily living. At admission, 3 patients were restricted to bed, 7 required a wheelchair, 23 were able to walk short distances using mobility aids (eg, walking frame, crutches), 3 were able to mobilise independently for short distances indoors and 16 were able to mobilise independently outdoors for at least 5 m.

In terms of their primary functional symptom, reflecting the degree of severity in our patient group, the majority of patients (n=31) had mixed symptoms (generally a combination of motor and sensory symptoms with non-epileptic seizures, plus cognitive symptoms in some cases) such that it was impossible to identify a primary symptom. Where a primary symptom could be identified these were seizures (n=9), functional motor symptoms (n=7), cognitive symptoms (n=3) and extreme fatigue (n=2). Sensory disturbance was common alongside motor symptoms, but no patients were admitted primarily for treatment of sensory symptoms. Systemic symptoms were reported commonly: 94% of patients reported fatigue, 96% pain, 84% dizziness, 78% bowel disturbance and 71% breathlessness.

Recorded medical and psychiatric comorbid diagnoses were lower than expected. 10 patients had no significant comorbidity recorded. The most commonly recorded psychiatric comorbidities were depression (n=9), emotionally unstable personality disorder (n=6) and autistic spectrum disorder (ASD) (n=4). The most common neurological comorbidities were epilepsy (n=5) and migraine (n=6). Other recorded medical comorbidities were typically metabolic, autoimmune or musculoskeletal in nature, though were often listed as 'possible' diagnoses or were otherwise unclear.

In contrast, rates of depression and anxiety, as measured by self-report scales were high. At admission, median score on the BDI-II was 23 (IQR 12–33), with 30 patients (58% of the sample) scoring 20 or more, suggestive of moderate clinical depressions.[1] STAI on admission across the cohort was 48 (IQR 36–59), with 30 patients (58%) scoring over 40, suggesting clinically relevant anxiety disorder. Depersonalisation derealisation (DP-DR) experiences were also reported at a high rate. Median admission score on the CDS was 73 (IQR 26–115), with 24 patients (46%) scoring above the clinical cut-off of 70 suggesting clinically significant DP-DR.

According to clinical notes, in the year prior to symptoms developing, 75% of patients reported they were under an abnormal amount of stress. 16 patients mentioned general sustained stress due to work, relationships or finances, 10 experienced a life-threatening health event, 10 suffered a loss event and 6 patients recalled a distinct traumatic event (such as a life-threatening accident or assault). In addition, lifetime history of abuse was reported by 44.2% of the patients. 11 patients reported a history of sexual abuse, 6 physical abuse and 5 reported complex patterns of abuse. Eight patients did not report either lifetime history of abuse or particular stress in the year preceding symptom development.

## Treatment outcomes

12 patients (23%) were discharged very much improved (CGI-I=1) and 12 patients (23%) much improved (CGI-I=2). 19 individuals (37%) were rated as achieving some improvement (CGI-I=3). Eight patients (15%) were felt not to have benefited (CGI-I=4). One patient deteriorated during their admission, related to exacerbation of a pre-existing mental health condition (table 2). Of note, this individual did not experience worsening of their somatic symptoms. In terms of specific symptom measures, the results were as follows:

### Mobility

In contrast to the situation at admission, at the time of discharge, only 3 patients were restricted to a bed or wheelchair, and 34 patients were able to mobilise independently without aids, including 4 of the 7 who had originally been dependent on a wheelchair, and 12 of the 23 who had been reliant on walking aids. In no case did mobility deteriorate during admission. Group FMS scores between admission and discharge were significantly different (Wilcoxon signed rank test, $z=4.241$, $p<0.001$).

### Depression

Median BDI-II score fell from 23 to 14, with a significant difference between groups at admission and discharge ($z=-3.189$, $p=0.001$). This suggests an overall moderate improvement in mood symptoms.

### Anxiety

STAI trait measures did not change significantly between admission and discharge, median score 48 at both admission and discharge (range on admission 20–71, on discharge 21–80, group comparison showing no significant difference, $z=1.084$, $p=0.278$).

### Depersonalisation

At the whole group level, CDS scores did not change significantly between admission and discharge (median on admission 73, range 0–200 73; median on discharge 65, range 0–240 $z=-0.711$, $p=0.477$); nor did any CDS

**Table 2** Outcome measures by CGI-I category

| | CGI-I category | 1 Very much improved | 2 Much improved | 3 Minimally improved | 4 No change | 5–7 Worsened | All cases |
|---|---|---|---|---|---|---|---|
| | n (%) | n=12 (23%) | n=12 (23%) | n=19 (37%) | n=8 (15%) | n=1 (2%) | n=52 (100%) |
| Becks Depression Index (BDI-II) | Admission, median (IQR) | 21.5 (22.5) | 24.5 (12) | 24.5 (23) | 24 (32) | 39 (0) | 23 (31) |
| | Discharge | 11 (12) | 16 (15) | 25 (35) | 2 (36) | 44 (0) | 14 (21) |
| | Change, effect size (p value) | 0.80 (p=0.005) | 0.74 (p=0.001) | 0.07 (p=0.79) | −0.89 (p=0.02) | NA | 0.49 (p<0.001) |
| Functional Mobility Scale | Admission, median (IQR) | 6 (3) | 3 (4.5) | 4 (4) | 4 (3) | 2 (0) | 4 (4) |
| | Discharge median (IQR) | 6 (0) | 6 (2.5) | 6 (2) | 4 (4) | 2 (0) | 6 (2) |
| | Change, effect size (p value) | 0.64 (p=0.06) | 0.79 (p=0.008) | 0.66 (p=0.0078) | 0.5 (p=0.5) | NA | 0.67 (p<0.001) |
| EQ-5D-5L | Admission median (IQR) | 0.25 (0.5775) | 0.511 (0.553) | 0.397 (0.489) | 0.226 (0.883) | 0.392 (0) | 0.364 (0.0508) |
| | Discharge median (IQR) | 0.735 (0.156) | 0.569 (0.284) | 0.553 (0.338) | 0.226 (1.248) | 0.409 (0) | 0.62 (0.31) |
| | Change, effect size, p value) | 0.78 (p=0.007) | 0.74 (p=0.008) | 0.56 (p=0.02) | 0.56 (p=0.32) | NA | 0.64 (p<0.001) |
| EQVAS (self report linear scale 0–100) | Admission median (IQR) | 50 (17.5) | 48.5 (20) | 45 (15) | 34 (55) | 50 (0) | 46 (15) |
| | Discharge, median (IQR) | 90 (80–90) | 70 (60–90) | 60 (50–70.5) | 50 (40–70) | 90 (0) | 65 (40) |
| | Change effect size, (p value) | 0.87 (p=0.002) | 0.81 (p=0.006) | 0.78 (p=0.001) | 0.47 (p=0.25) | NA | 0.82 (p<0.001) |
| STAI-Trait | Admission, median (IQR) | 43 (28.5) | 43.5 (9.5) | 51.5 (28) | 59.5 (36) | 72 | 48 (23) |
| | Discharge median (IQR) | 50 (18) | 47.5 (14.5) | 49.5 (31) | 32 (29) | 78 | 48 (28) |
| | Change, effect size (p value) | −0.46 (p=0.14) | −0.23 (p=0.45) | −0.06 (p=0.83) | NA due to missing data | NA | −0.16 (p=0.3) |

CGI-I, Clinical Global Impression Improvement; EQVAS, EuroQol Visual Analogue Scale; NA, not available; STAI, Spielberger Trait Anxiety Inventory.

subscales[13] show significant change. There was a trend for high CDS scores to be associated with a history of abuse and/or other traumatic experiences (table 3), although this pattern was not statistically significant.

### Quality of life

EQ-5D-5L and EQVAS were used as a self-report measure of overall health. Median EQ index scores increased significantly from 0.364 to 0.62. (z=4.208, p<0.001). On admission, the median rating of general health on the EQ-VAS was 46/100 (range 10–90), on discharge, this had increased to 65/100 (range 29–100) (z=5.189, p<0.001). Increases in quality of life were reported even by the group of patients showing only minimal improvements clinically (see table 2).

### Illness perception

Comparing IPQ subscale scores at admission and discharge showed a significant decrease in the 'emotional representations' (z=−3.456, p<0.01) subscale, and a significant increase in the 'illness coherence' (z=2.958, p=0.03) subscale at the time of discharge. Other IPQ subscales showed no significant change over time.

### Medication use

At admission, patients were taking a median of 5 medications (range 0–19); at discharge, the median was 4 (range 0–15), with group comparison showing this was a significant decrease (z=−3.090, p=0.002).

## Variables associated with treatment outcome

We explored the association of variables recorded at admission with the main clinical outcome with a non-parametric correlation (online supplemental materials). Psychiatric or medical comorbidity was not associated with poor outcome. Duration of symptoms (Spearman's r=0.327, p=0.018), and high trait anxiety (rho=0.336, p=0.018) correlated with worse outcome while the IPQ 'treatment control' subscale, which reflects the degree of confidence in the treatment being offered, correlated with improved outcome (r=−0.404, p=0.004). We tested the predictive value of these variables for admission outcome with a logistic regression analysis. The only significant predictor for improved clinical outcome was the IPQ treatment control subscale: for every 1 unit increase in the belief in treatment score at admission, the probability of achieving a good clinical outcome increases by a factor of 1.494 (coefficient B=0.402, p=0.023).

To explore the associations between changes in clinical rating scales and overall clinical improvement, we also examined correlations between CGI-I and the changes in scores between admission and discharge in the FMS, BDI-II, STAI, CDS (and CDS subscales) and IPQ (and IPQ subscales). Positive changes in rating scale scores were significantly correlated with clinical improvement for the FMS, BDI-II and the 'anomalous body experience' subscale of the CDS (table 4).

**Table 3** Cambridge Depersonalisation Scale (CDS) scores at admission and discharge are presented according to trauma and abuse history

| | | Lifetime history of abuse | | | | Stress in year preceding symptom onset | | |
|---|---|---|---|---|---|---|---|---|
| | All cases (n=52) | No abuse history (n=29) | Sexual assault or abuse (n=11) | Physical abuse (n=6) | Complex abuse (n=5) | None identified (n=13) | General stress* (n=15) | Specific stressful event† (n=24) |
| % female (or assigned female at birth) | 67% | 53% | 82% | 100% | 80% | 69% | 60% | 66% |
| Duration of symptoms in years median (IQR) | 5.5 (10.5) | 5 (31) | 5 (6) | 6 (11.25) | 13 (23) | 4 (9) | 6 (10) | 6.5 (11) |
| Admission Total CDS (clinical cut-off >70) median (IQR) | **73 (90.75)** n=46 | 58 (99.5) n=26 | **101 (36.5)** n=9 | 58 (48.5) n=5 | **115 (160.5)** n=5 | 52 (59) n=11 | **86.5** (74.75) n=14 | **92 (126.5)** n=21 |
| Discharge Total CDS (clinical cut-off >70 median (IQR) | 65 (80) n=41 | 65 (65) n=23 | 64 (31) n=7 | 6 (104) n=5 | **151 (203)** n=5 | 56 (55.5) n=9 | 49 (78.75) n=10 | **85 (99.25)** n=22 |
| Change in CDS admission to discharge median (IQR) | −4 (31) n=39 | −2.5 (23.5) n=22 | −14 (63) n=7 | 8.5 (59.25) n=4 | 2 (72.5) n=5 | 2 (33) n=9 | −11 (20) n=10 | 1.5 (56.25) n=20 |

This included episodes of poor health requiring intensive care/assaults/accidents and significant loss events. Scores above the clinical threshold for depersonalisation disorder are indicated in bold.
*General stress was coded when notes indicate recollection of significant stress during the preceding year to symptom onset in the area of finances, work or relationships.
†Stressful event was coded when specific event perceived as traumatic was reported in year preceding symptoms.

**Table 4** Correlations between primary clinical outcome and changes in clinical rating scale scores between admission and discharge

| | Correlation with CGI-I (r, p value) |
|---|---|
| Change in FMS | −0.525, 0.002 |
| Change in BDI-II | −0.506, <0.001 |
| Change in STAI | −0.049, 0.757 |
| Change in CDS | −0.291, 0.72 |
| Change in CDS-ABE | −0.409, 0.010 |
| Change in CDS-EN | −0.245, 0.132 |
| Change in CDS-ASR | −0.157, 0.340 |
| Change in CDS-AFS | −0.248, 0.128 |

CDS Subscales.
ABE, Anomalous Body Experience; AFS, Alienation From Surroundings; ASR, Anomalous Subjective Recall; BDI-II, Beck Depression Inventory; CDS, Cambridge Depersonalisation Scale; CGI-I, Clinical Global Impression Improvement; EN, emotional numbing; FMS, Functional Mobility Scale; STAI, Spielberger Trait Anxiety Inventory.

## DISCUSSION

Overall, most patients (43/52) showed improvement in their condition as indexed by the primary outcome measure (CGI-I), with 24 rated as 'much improved' or 'very much improved'. One patient was discharged early due to a mental health crisis requiring inpatient psychiatric treatment. 8/52 patients showed no clinical change. This adds to evidence that partially or entirely successful treatment of severe FND is possible in intensive rehabilitation settings with a specialist multidisciplinary team[6 24]; where adequate time can be given for treatment (this last point is key, as not all specialist treatment centres are able to offer such lengthy admissions). Treatment had a statistically significant impact on mobility, depression scores, medication use and overall quality of life. Scores on the IPQ 'emotional representations' subscale, which consists of statements such as 'I get depressed when I think about my illness' and 'my illness makes me feel angry', were significantly lower at discharge while scores on the 'illness coherence' subscale (which probes the degree to which the patient feels they understand their illness) were significantly higher at discharge. Taken together, these suggest that by the time of discharge, patients experienced their condition as more understandable and less distressing.

Previous studies have suggested that factors such as longer duration of symptoms or psychiatric comorbidity are associated with poorer treatment outcomes.[25] In our sample, duration of symptoms, trait anxiety score at admission and score on the 'treatment control' subscale of the IPQ were all associated with eventual treatment outcomes. Longer duration of symptoms and higher trait anxiety at admission were associated with poorer outcomes while the IPQ subscale score was positively correlated with better outcomes. Logistic regression analysis shows that this variable alone had predictive power with respect to overall treatment outcome, suggesting that confidence in treatment at the outset is a powerful determinant of eventual outcome. Notably, other subscales of the IPQ which probe patients' beliefs about the cause of their symptoms (the 'psychological attributions', 'risk factors' and 'immunity' subscales) was not correlated with treatment outcomes. This suggests that faith in the treatment, the professionals delivering it, and in their own ability to make use of treatment, is more important for outcome than beliefs about causes of illness. In functional somatic disorders, evidence suggests that treatments where the patient takes an active rather than a passive role are most effective,[26] suggesting that an important component of treatment might be in helping the patient experience a sense of agency in relation to their symptoms. Scores on the IPQ 'treatment control' subscale have previously been shown to be associated with treatment outcomes in a range of clinical settings, including in somatoform disorders,[27] but to our knowledge, this is the first time this measure has been shown to be the single most predictive factor in an FND cohort.

Levels of DP-DR were high across the cohort while changes in the 'anomalous body experience' subscale of the CDS were correlated with better clinical outcomes. This subscale probes feelings of lack of body ownership or agency, experiences that are common in FND and which in this cohort reduced over time in a way that correlated with overall treatment outcome. These findings support the conceptualisation of FND as a disorder on the dissociative spectrum.[28] Dissociative symptoms, trauma and adverse life events are common in FND.[28] Such experiences are twice as common in FND than in comparable psychiatric disorders, and eight times more common than in the general population,[29] and may have a role in precipitating symptoms in some patients with FND,[30] although this relationship is complex and unclear.[29 31] In this sample, raw CDS scores were higher in subgroups who reported a history of sexual or complex abuse and in those who reported a specific stressful event in the year preceding symptom onset, but these group differences were not statistically significant. Comparable rates of traumatic and stressful life events preceding the onset of FND are seen across the literature.[29] Our data do not allow us to make claims regarding aetiology but do hint that treatment targeted at resolving complex trauma and dissociative experiences might be of particular benefit in some FND subgroups.

Our data support the understanding that depression and anxiety are common in chronic functional disorders, even when not formally diagnosed, and if not addressed may limit the effectiveness of any treatment undertaken. However, formally recorded comorbid diagnoses were lower than expected for this cohort. This may reflect an underestimation inherent in the methods of the current study, which relied on algorithmic search strategies of clinical notes related to the current inpatient episode. Most of the patients came from other areas of the country, and

medical records (eg, GP records), including pre-existing diagnoses, needed to be transferred manually during the admission process, otherwise diagnosed or documented during the treatment period. This suggests a number of routes by which diagnoses considered less relevant to the current presentation might be missed. However, it seems plausible that when patients present with complex and unusual somatic symptoms, sometimes associated with psychiatric symptoms such as persistent low mood or anxiety, clinicians may feel that there is no clear unifying diagnosis and may be reluctant to make formal diagnoses that may relate to only one aspect of the overall presentation. It is a matter of debate whether to consider these parts of the same complex condition or to diagnose and manage them as separate conditions. In terms of improving treatment outcomes for patients, a coherent approach to diagnosis that optimises engagement is likely to be key. This is likely to be particularly important in patients with high levels of anxiety or dissociation, who may benefit from a particular therapeutic focus on these aspects in order to facilitate engagement with other elements of the treatment programme. However, with regard to ASD specifically, it was our strong clinical impression that some patients included in this study would meet criteria for ASD, despite having no formal diagnosis, and in these cases, we recommended specialist assessment for this following discharge from the unit.

### Limitations

There are important limitations to our study. Due to the unique setting and clinical characteristics of the cohort, it was not possible to identify a suitable control group for comparison. The retrospective design limits statistical analyses to exploratory and descriptive methods only, and the nature of the patient cohort, that is, those with particularly severe FND, may limit applicability to patients with milder forms of FND.

The lack of standardised outcome measures in FND is recognised as a limitation to studying treatment in this cohort.[21] Data were collected in an unpredictable clinical setting, and some are incomplete. Findings regarding adverse life experiences are limited by not having used a validated measure to capture lifetime events. Certain forms of endogenous stress known to be associated with this patient group, such as childhood neglect,[32] were not captured in our data set.

An important limitation is that follow-up measures were not recorded after discharge. Other studies suggest an expected relapse rate of around 18% at 1-year follow-up.[3] In general, long-term outcomes of inpatient treatment for FND are not well documented and warrant further study.

## CONCLUSIONS

These results contribute to the evidence that partial or complete recovery from FND is possible even where symptoms are enduring and severe. Significant clinical improvements were seen in overall health and in specific measures of motor function, depression, medication use and quality of life. Patient confidence in the treatment programme emerged as the most significant predictive factor for eventual outcome. Depersonalisation experiences should be explored routinely in FND and merit consideration as a specific treatment target in some patients. We would add that these results reflect a service that provides personalised intensive multidisciplinary inpatient rehabilitation, with tailored length of treatment, which is often lengthy. This point needs to be borne in mind when planning the expansion of specialist service delivery in this under-resourced area.

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**Contributors** CS led on data preparation and initial analysis and wrote the first draft of the manuscript. HB, DA, FC and HJ contributed to data collection, patient ratings and to the writing of the manuscript. NS contributed to data analysis and interpretation and to writing the manuscript. NM supervised the project, undertook data analysis and interpretation, wrote sections of the discussion and finalised the manuscript. NM is the guarantor.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient consent for publication** Not applicable.

**Ethics approval** Verbal consent that anonymised clinical data and outcome measures could be used for research purposes was elicited and formally recorded in patient notes at the time of completing admissions measures. Ethical approval was granted by the South London and Maudsley CRIS project team and data was then extracted using the CRIS anonymised patient records system. (CRIS project ID 20-063). CRIS is a Clinical Record Interactive Search which renders deidentified copies of the electronic clinical notes available for research use with appropriate governance structures. CRIS received ethical approval as an anonymised data resource for secondary analyses from the Oxford C Research Ethics Committee (reference: 08/H0606/71+5).

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Data availability statement** As stated in the paper, data generated using the CRIS system need to remain within the SLAM firewall, but it is possible for these data to be released on reasonable request and the obtaining of the necessary permissions.



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