

A psychoeducational intervention increases use of a delirium protocol by Neurologists and Neurosurgeons in patients with brain disorders

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Objectives: Over 50% of inpatients with neurological disorders may present with a co-morbid psychiatric illness. Delirium has a reported point prevalence of 20% in hospital inpatients and is frequently undetected. We aimed to (1) examine inpatient referrals to a Liaison Neuropsychiatry service and (2) review the diagnosis and management of delirium before and after an educational intervention.

Methods: An initial 6-month audit of referrals to the inpatient Liaison Neuropsychiatry service was conducted in 2018. We then undertook a psychoeducational intervention to raise awareness of the diagnosis and management of delirium. We conducted a re-audit of referrals to the service in 2019.

Results: On initial audit, of 84 referrals, the most common referral was for mood (38%; $n = 32$). Just 4% ($n = 3$) had a specific delirium query. Following assessment by Neuropsychiatry, organic disorders (43%; $n = 32$), including delirium (33%; $n = 25$), were the most common diagnoses. On re-audit, of 86 referrals, mood assessment remained the most common reason for referral (38%; $n = 33$) and 2% ($n = 2$) were referred for possible delirium. Organic disorders remained the most common diagnoses (53%; $n = 45$) including delirium (38%; $n = 32$). We found a significant increase in the use of the delirium protocol from 12% ($n = 3$) on initial audit to 47% ($n = 15$); $p < 0.01$ on re-audit despite no increase in the number of specific delirium queries.

Conclusions: A psychoeducational intervention improves the management of delirium by Neurologists and Neurosurgeons in patients with brain disorders.

Received 8 June 2020; Revised 23 August 2020; Accepted 7 September 2020; First published online 23 November 2020

Key words: Delirium, intervention, Neuropsychiatry.

Background

There is a high rate of psychiatric co-morbidity in patients with neurological disorders and it has been estimated that more than 50% of inpatients with neurological disorders may present with a co-morbid psychiatric illness (Fink *et al.* 2003; Jefferies *et al.* 2007; O'Brien *et al.* 2009). Psychiatric co-morbidities can have a significant impact on recovery and length of stay in hospitalised patients, and early recognition and intervention may help to improve outcomes (Jansen *et al.* 2018). Potential barriers to care include a reluctance to create additional diagnoses for patients and stigma as well as lack of resources specific to this patient group (Moriarty, 2007).

Psychiatric illness has been found to commonly be missed by Neurologists (Bridges & Goldberg, 1984). In addition, patients with brain disease want to be asked

about their mental health. Bridges and Goldberg (Bridges & Goldberg, 1984) assessed 100 inpatients on a Neurology ward using a clinical interview schedule. Of the 39% with a psychiatric illness, the majority wished that an enquiry into their mood had been made and of the 61% without a psychiatric illness, half still wished that the Neurology team had enquired into their mood (Bridges & Goldberg, 1984). Neuropsychiatry services can assist Neurologists and Neurosurgeons in the assessment and management of these disorders (O'Brien *et al.* 2009).

Delirium is a complex neuropsychiatric syndrome (Levenson, 2005) associated with prolonged hospital admissions and increased mortality (González *et al.* 2009; Witlox *et al.* 2010; Fong *et al.* 2012). It has been defined most recently by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) as disturbance in attention, awareness and cognition, which develops over a short time period (normally hours to days), is caused by direct physiological consequences of another medical condition and is not better explained

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by another pre-existent neurocognitive disorder (American Psychiatric Association, 2013). Delirium has been found to have a point prevalence of 20% in hospital inpatients (Ryan *et al.* 2013). Delirium is misdiagnosed, diagnosed late, or missed in as many as 30–75% of cases (Laurila *et al.* 2004; Kean & Ryan, 2008; Bellelli *et al.* 2015) with poorer recognition of hypoactive as compared to hyperactive delirium having been reported (Collins *et al.* 2010). A lack of screening, poor education regarding delirium, delirium not being seen to belong to a specific specialty, lack of public awareness and ageism have all been cited as reasons for poor recognition and treatment (Teodorczuk *et al.* 2012).

Various interventions have been undertaken to address these issues. Welch & Jackson (2018) found that undertaking a study of delirium was sufficient to improve recognition by hospital staff (Welch & Jackson, 2018). Jenkin *et al.* (2016) found improvements in knowledge of delirium among non-consultant hospital doctors (NCHDs) following the introduction of NICE guidelines on delirium and national incentivisation of cognitive screening in older adults (Jenkin *et al.* 2016). Delirium teaching in undergraduate education has been found to be insufficient and could be an important factor in improving recognition and treatment of delirium (Fisher *et al.* 2015). Experience in geriatric medicine has been associated with only a small increase in knowledge among NCHDs (Jenkin *et al.* 2014).

Aim

We aimed to (1) examine the inpatient referrals to the Liaison Neuropsychiatry service in an Irish national tertiary referral centre for Neurosurgery and Neurology and (2) review the diagnosis and management of delirium by the referring team's utilisation of a local delirium protocol before and after a staff delirium psychoeducational intervention. The delirium protocol is appended (Appendix 1) and includes instructions on the diagnosis of delirium along with both environmental and pharmacological interventions.

Methods

Setting

Beaumont Hospital is an 820-bed university teaching hospital with a tertiary referral Neurology and Neurosurgery service. The Neuropsychiatry service provides an inpatient Liaison Consultation service primarily to the Neurology and Neurosurgical teams along with outpatient services.

Data collection and intervention

We initially conducted an audit of the referrals to the inpatient Liaison Neuropsychiatry service from January to June 2018. This was conducted in September 2018. Data were collected from the record of referrals to the Neuropsychiatry service and included the reason for referral, referring team, diagnosis based on the International Classification of Diseases (ICD-10) coding and management. Following the initial audit, we devised an appropriate educational intervention to raise awareness of the diagnosis and management of delirium by assessing the use of a local delirium protocol. We provided a psychoeducational intervention at an individual and small group level to the Neurology and Neurosurgical NCHDs and also presented at Neurology and Neurosurgery education sessions a method that has shown efficacy in previous studies (Teodorczuk *et al.* 2009). We had previously designed a local delirium protocol and ensured that copies of the protocol were placed in key areas on the Neurology and Neurosurgical wards and that electronic copies were placed on all computer desktops within these wards. Following the educational intervention, we then conducted a re-audit of referrals, to the service, recognition of delirium and adherence to the local delirium protocol between January and June 2019.

Analysis

Simple statistics and chi-square tests were used.

Ethical approval was obtained from the local clinical governance and audit committee.

Results

Initial audit

There were 84 referrals to the Neuropsychiatry service in the initial audit between January and June 2018: 43% ($n = 36$) were male and the mean age was 46 years with a range of 7–79 years; 63% ($n = 53$) of referrals were from Neurology and 37% ($n = 31$) were from Neurosurgery. The most common reasons for referral were for assessment of mood (38%; $n = 32$) and anxiety (11%; $n = 10$) (Fig. 1). Organic disorders were the most common diagnoses (45%, $n = 32$) (Table 2). Of the 75 patients assessed, 9.3% ($n = 7$) had no psychiatric diagnosis (Table 1) and 36% ($n = 27$) had more than one psychiatric diagnosis (Table 2). Use of the delirium protocol, neuropsychology referral and referral to community psychiatric services were the most common forms of management following assessment by the Neuropsychiatry team in 2018 (Fig. 2). On initial audit, 4% ($n = 3$) were referred with a specific query of delirium (Fig. 1) and delirium was subsequently diagnosed by Neuropsychiatry in 33% ($n = 25$) of the

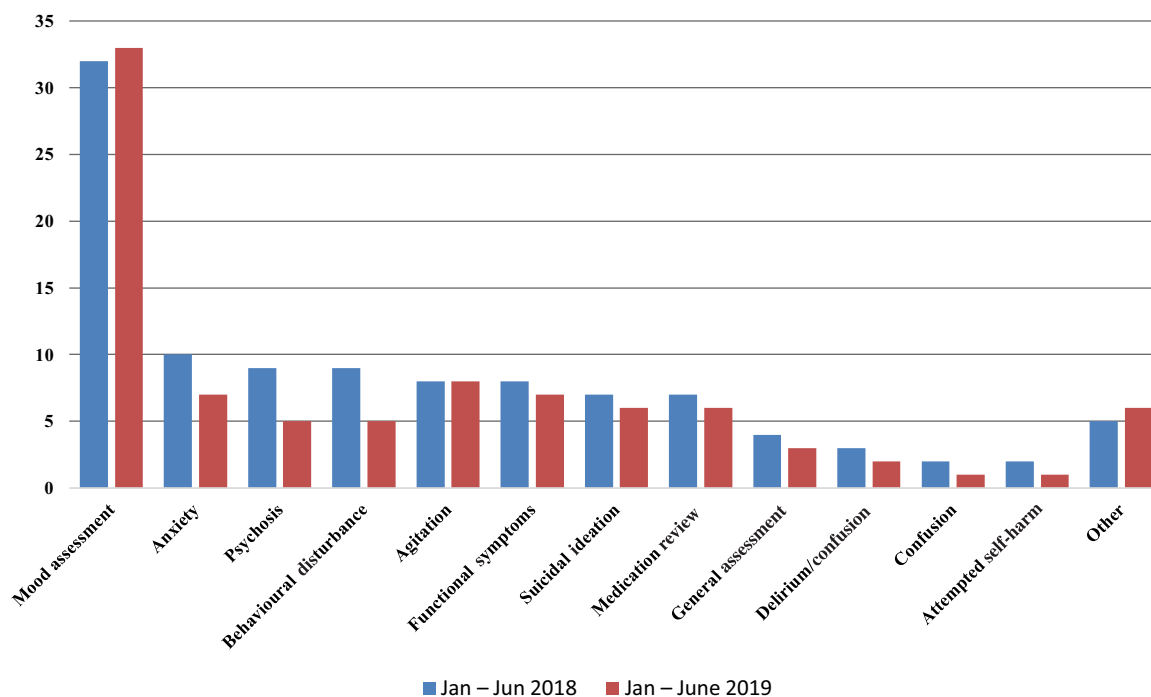


Fig. 1. Reason for referral (Please note that multiple terms were used in some referrals and have all been accounted for here).

Table 1. ICD-10 diagnoses following Neuropsychiatry assessment

ICD 10 Code	Diagnosis	2018 total (n = 75) n (%)	2019 total (n = 85) n (%)
F0	Organic, including symptomatic, mental disorders	32 (42.7%)	45 (52.9%)
F05	Delirium	25 (33.3%)	32 (37.6%)
F10	Mental and behavioural disorders due to use of psychoactive substances	14 (18.7%)	13 (15.1%)
F20	Schizophrenia, schizoaffective and delusional disorders	2 (2.7%)	2 (2.4%)
F30	Mood (affective) disorders	12 (16%)	16 (18.8%)
F40	Neurotic, stress-related and somatoform disorders	27 (36%)	26 (30.1%)
F5	Behavioural syndromes associated with physiological disturbances and physical factors	1 (1.3%)	0
F6	Disorders of personality and behaviour in adult persons	8 (10.7%)	3 (3.5%)
F7	Mental retardation	2 (2.7%)	3 (3.5%)
Z00	Encounter for general examination without complaint, suspected or reported diagnosis	7 (9.3%)	6 (7.1%)

patients assessed. The local delirium protocol was utilised prior to referral in 12% ($n = 3$) of patients who received a diagnosis of delirium from the Neuropsychiatry team (Table 3).

Re-audit

On re-audit in January–June 2019, there were 86 referrals to the Neuropsychiatry service. Demographically, 52% ($n = 45$) were male (slightly higher than the previous year

but not significant; $X^2(1, n = 170) = 1.5, p = 0.2$). The mean age was 48 years with a range of 11–85 years; 44% ($n = 38$) of referrals were from Neurology, 52% ($n = 45$) were from Neurosurgery and 3.5% ($n = 3$) were from the Radiation Oncology, Respiratory and Paediatric teams. Mood assessment remained the most common reason for referral (38%; $n = 33$). Following assessment by the Neuropsychiatry team, organic disorders remained the most common diagnoses (53%; $n = 45$). Of the 85 patients assessed, 7.1% ($n = 6$) had no psychiatric diagnosis

Table 2. Number of psychiatric diagnoses per case

Number of diagnoses	2018 (<i>n</i> = 75) <i>n</i> (%)	2019 (<i>n</i> = 85) <i>n</i> (%)
None	7 (9.3%)	6 (7.1%)
1	41 (54.7%)	49 (57.6%)
2	20 (26.7%)	21 (24.7%)
3	5 (6.7%)	7 (8.2%)
4	2 (2.7%)	2 (2.3%)

(Table 1) and 35% (*n* = 30) had more than one psychiatric diagnosis (Table 2). Use of the delirium protocol, neuropsychology referral and medication advice were the most common forms of management following assessment by the Neuropsychiatry team in 2019 (Fig. 2). On re-audit, 2% (*n* = 2) were referred with a specific query for delirium (Fig. 1) and delirium was subsequently diagnosed by Neuropsychiatry in 38% (*n* = 32) of the patients assessed. The local delirium protocol was utilised prior to referral in 47% (*n* = 15) of those who received a diagnosis of delirium by the Neuropsychiatry team (Table 3). This reflects a significant increase in use of the delirium protocol ($p < 0.01$) despite no increase in the number of delirium query referrals.

Discussion

While the proportion of referrals with a subsequent diagnosis of delirium remained the same across both years (approximately one-third of all referrals), we found that a psychoeducational intervention significantly improved the use of the delirium protocol ($p < 0.01$) by Neurologists and Neurosurgeons in patients with brain disorders prior to referral to a Neuropsychiatry service. On re-audit, the delirium protocol was utilized prior to Neuropsychiatry referral in 47% (*n* = 15) of those with a subsequent diagnosis of delirium as compared to just 12% (*n* = 3) in the initial audit.

It is unclear why, despite the significantly increased use of the delirium protocol, there was no increase in the number of delirium query referrals, which were low across both years. It seems that the teams possibly do recognise delirium but are hesitant to name it. This may be due to concern around missing other psychiatric diagnoses, being denied psychiatry review in the past or concerns regarding the implications around increased length of stay. It may also reflect a lack of confidence among Neurology and Neurosurgery teams in making this diagnosis as other terms such as 'confusion', 'behavioural disturbance' and 'agitation' were often used indicating that teams may have implicitly made the diagnosis without using the specific term 'delirium'.

Recognition of delirium can be poor in clinical settings although psychoeducation and research activity related to delirium has been shown to improve recognition and potentially improve outcomes (Babine *et al.* 2018; Welch & Jackson, 2018). We primarily targeted NCHDs with our intervention. However, nursing staff were included in this intervention and made aware of the delirium protocols that were made available on the ward. The education of nursing staff and more senior members of the team is likely to have the most profound cultural effect on the recognition and management of delirium given the higher turnover of NCHDs.

Our results highlight the wide range of psychiatric co-morbidities in a population of inpatients with neurological disorders and the role of an integrated specialist psychiatry service in their recognition and management. The rate of referral was similar across both audit years. There was a higher proportion of male referrals in the re-audit but not meeting statistical significance ($p = 0.2$). The mean age did not differ significantly across the two time periods with a broad age range both years. Most referrals were from Neurology and Neurosurgical teams with a small number from other sources.

The proportion of referrals from the Neurosurgery and Neurology teams across these time periods contrasts with a previous study of Neuropsychiatry referrals in Beaumont Hospital in 2002 and 2005 where there was a higher rate of referrals (approximately 115 over a 6-month period in 2002 and 156 over 6 months in 2005) but with 85% of referrals coming from the Neurology team (O'Brien *et al.* 2009). This most likely relates to changes in the referral pathways of patients referred with seizure disorders.

The most common reason for referral in this study was for mood assessment. The most common diagnosis was delirium followed by adjustment disorder in both years and most patients had one diagnosis only. In this study, we also found a low rate of dissociative and somatoform disorders which is consistent with findings in inpatient populations elsewhere (Jefferies *et al.* 2007). Most patients with dissociative disorders are seen in our outpatient clinic, similar to other services (Carson *et al.* 2000). As referral pathways for inpatients with dissociative and somatoform disorders alone generally suggest initial referral to Neuropsychology, these findings likely reflect the growth of the Neuropsychology and outpatient service in managing dissociative disorders.

Use of the delirium protocol and Neuropsychology involvement remained two of the most common management approaches following Neuropsychiatry input across both audit years and this is reflective of the most common diagnoses. There was an increase in medication advice in 2019. This likely relates to pharmacological intervention for delirium and the identification of

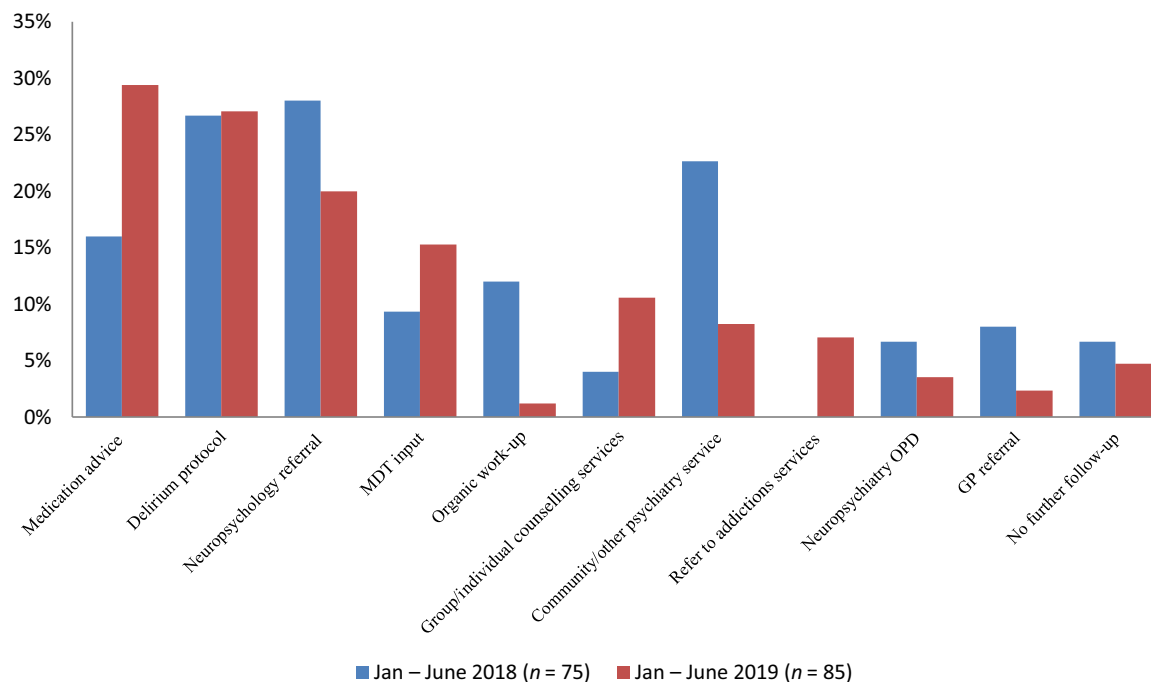


Fig. 2. Management plan following review by Neuropsychiatry.

Table 3. Delirium management prior to referral and subsequent diagnosis by Neuropsychiatry

Delirium management and subsequent diagnosis	January–June 2018	January–June 2019	Statistical significance
Delirium protocol utilized: <i>n</i> (%)	3 (12%)	15 (47%)	$X^2 (1, n = 57) = 7.9, p = 0.005$
Delirium diagnosis: <i>n</i> (%)	25 (33%)	32 (37%)	$X^2 (1, n = 170) = 1.06, p = 0.3$

deliriogenic medications. However, the exact nature of the medication advice was not recorded for the purpose of this audit.

Limitations to this study include the fact that there was a different cohort of Neurology, Neurosurgical and Neuropsychiatry trainees in both audit years. However, the Interns referring and initially managing delirium were in their second 6 months of training both years meaning that they had similar levels of knowledge and experience. We did not use standardised measurement tools as recommended in previous studies (Milisen *et al.* 2002). However, delirium here is diagnosed by an established Neuropsychiatry service. We used the delirium protocol as a proxy measure of appropriate recognition and management by the treating teams prior to referral but did not look at subsequent outcomes such as length of stay.

Interdisciplinary liaison and ongoing psychoeducation are essential in the early detection and management of patients with brain disorders and co-morbid delirium. Raising awareness among patients and their family members may also help in the recognition of this

disorder (Teodorczuk *et al.* 2012). In this study, we have shown that a targeted psychoeducational staff intervention significantly enhances the use of the delirium protocol in these vulnerable patient groups. Future studies should look at the effect of early use of the delirium protocol on length of stay, explore treating teams' reticence in diagnosing delirium, examine the use of environmental as compared to pharmacological interventions for delirium and place greater emphasis on the involvement of the multidisciplinary team such as nursing staff and occupational therapy.

Ethical Standards

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committee on human experimentation with the Helsinki Declaration of 1975, as revised in 2008. The authors assert that ethical approval for publication of this service evaluation has been provided by their local Ethics Committee.

Financial Support

This research received no specific grant from any funding agency, commercial or not-for-profit sectors.

Conflict of Interest

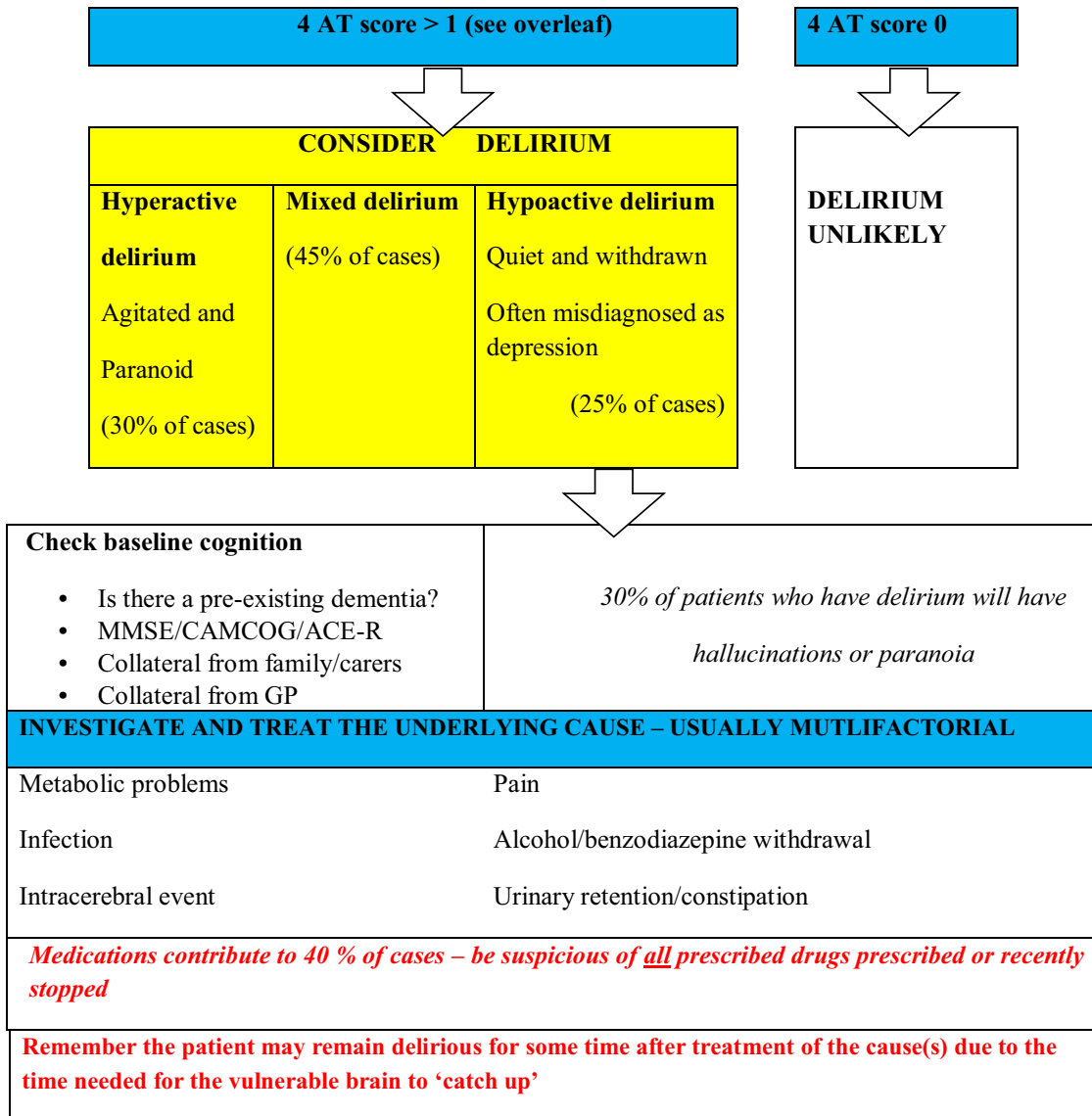
None.

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Appendix 1: Beaumont local delirium protocol

DELIRIUM PROTOCOL



Can you modify the environment?	
One-to-one nursing (consider 1:1 supervision)	Try to nurse in a quiet well lit, side room (otherwise avoid changing room/ward)
Can family stay with the patient for some time	Regular cues to orientate the patient – time and place (e.g. calendar and clock)

Medication		
Only use medications if your patient is very agitated/distressed or at risk of causing harm to themselves or others		
If alcohol or benzodiazepine withdrawal is a possibility, refer to alcohol withdrawal guidelines		
	<u>Low/starting dose</u>	<u>Frail, elderly patient</u>
Haloperidol	0.5–1mg BD/TDS	0.25–0.5mg BD/TDS
Quetiapine*	25–50mg BD/TDS	12.5–25mg BD/TDS
*If EPSE prone or haloperidol contraindicated (i.e. Lewy body dementia or Parkinson’s disease)		
Concomitant benzodiazepine if severe agitation (lorazepam 0.25–0.5mg)		
Consider regular maintenance treatment if precipitant remains but review medications daily		
Aim to discontinue the medication prior to discharge		

For additional advice, contact the Department of Psychiatry ext.

Appendix 2: Full diagnostic table

ICD 10 Code	Diagnosis	2018 total (n = 75) n (%)	2019 total (n = 85) n (%)
F0	Organic, including symptomatic, mental disorders	32 (42.7%)	45 (52.9%)
F01	Vascular dementia	1 (1.3%)	1 (1.8%)
F02	Dementia in other disease classified elsewhere	2 (2.7%)	1 (1.8%)
F03	Unspecified dementia	1 (1.3%)	1 (1.8%)
F05	Delirium	25 (33.3%)	32 (37.6%)
F06	Mental disorders due to known physiological condition	3 (4.0%)	10 (11.7%)
F1	Mental and behavioural disorders due to use of psychoactive substances	14 (18.7%)	13 (15.1%)
F10	Mental and behavioural disorders due to alcohol use	7 (9.3%)	9 (10.6%)
F12	Mental and behavioural disorders due to cannabis use	3 (4.0%)	1 (1.8%)
F14	Mental and behavioural disorders due to cocaine use	2 (2.7%)	1 (1.8%)
F19	Mental and behavioural disorder due to polysubstance use	2 (2.7%)	2 (2.4%)
F2	Schizophrenia, schizoaffective and delusional disorders	2 (2.7%)	2 (2.4%)
F20	Schizophrenia	1 (1.3%)	2 (2.4%)
F22	Persistent delusional disorder	1 (1.3%)	0
F3	Mood (affective) disorders	12 (16%)	16 (18.8%)
F31	Bipolar Affective disorder (BPAD)	1 (1.3%)	2 (2.4%)
F31.4	BPAD, current episode severe with psychotic symptoms	1 (1.3%)	0
F31.7	BPAD, currently in remission	1 (1.3%)	0
F32.8	Depressive episode	1 (1.3%)	2 (2.4%)
F33	Recurrent depressive disorder (RDD)	1 (1.3%)	6 (7.1%)
F33.4	RDD, currently in remission	6 (8.0%)	6 (7.1%)
F39	Affective disorder Not Otherwise Specified	1 (1.3%)	0
F4	Neurotic, stress-related and somatoform disorders	27 (36%)	26 (30.1%)
F40	Phobic anxiety disorder	1 (1.3%)	1 (1.8%)
F41	Anxiety disorder	3 (4.0%)	4 (4.7%)
F42	Obsessive Compulsive Disorder	1 (1.3%)	1 (1.8%)
F43.1	Post Traumatic Stress Disorder	2 (2.7%)	0
F43.2	Adjustment disorder	11 (14.7%)	12 (14.1%)
F44	Dissociative disorder	6 (8.0%)	7 (8.2%)
F45	Somatoform disorders	3 (4.0%)	1 (1.8%)
F5	Behavioural syndromes associated with physiological disturbances and physical factors	1 (1.3%)	0
F50.9	Eating disorder, unspecified	1 (1.3%)	0
F6	Disorders of personality and behaviour in adult persons	8 (10.7%)	3 (3.5%)
F60.3	Borderline personality disorder	8 (10.7%)	3 (3.5%)
F7	Mental retardation	2 (2.7%)	3 (3.5%)
F70	Intellectual disability	2 (2.7%)	3 (3.5%)
Z00	Encounter for general examination without complaint, suspected or reported diagnosis	7 (9.3%)	6 (7.1%)
Z00.4	General psychiatric examination	7 (9.3%)	6 (7.1%)