Vocally disruptive behaviour in nursing home residents in Ireland: a descriptive study

C. Nwogbunyama[1],*, B. D. Kelly[2] and C. Cooney[3]

[1] *West Blanchardstown Mental Health Service, Blanchardstown Primary Care Centre, Dublin 15, Ireland*
[2] *Department of Psychiatry, Trinity College Dublin, Trinity Centre for Health Sciences, Tallaght University Hospital, Dublin 24, Ireland*
[3] *Department of Old Age Psychiatry, Carew House, St Vincent's University Hospital, Dublin 4, Ireland*

Background: Vocally disruptive behaviour (VDB) is relatively common in nursing home residents but difficult to treat. There is limited study on prevalence and treatment of VDB. We hypothesise that VDB is a result of complex interaction between patient factors and environmental contributors.

Methods: Residents of nursing homes in south Dublin were the target population for this study. Inclusion criteria were that the residents were 65 years or over and exhibited VDB significant enough for consideration in the resident's care plan. Information on typology and frequency of VDB, Interventions employed and their efficacy, diagnoses, Cohen-Mansfield Agitation Inventory scores, Mini-Mental State Examination scores, and Barthel Index scores were obtained.

Results: Eight percent of nursing home residents were reported to display VDB, most commonly screaming (in 39.4% of vocally disruptive residents). VDB was associated with physical agitation and dementia; together, these two factors accounted for almost two-thirds of the variation in VDB between residents. One-to-one attention, engaging in conversation, redirecting behaviour, and use of psychotropic medication were reported by nurses as the most useful interventions. Analgesics were the medications most commonly used (65.7%) followed by quetiapine (62.9%), and these were reportedly effective in 82.6% and 77.2% of residents respectively.

Conclusions: VDB is common, challenging, and difficult to manage. The study of VDB is limited by a variety of factors that both contribute to this behaviour and make its treatment challenging. Issues relating to capacity and ethics make it difficult to conduct randomised controlled trials of treatments for VDB in the population affected.

Introduction

With an ageing population and de-institutionalisation of psychiatric hospitals, nursing homes have become a significant resource for continuing care of the elderly. In Ireland, 5.3% of the population of people aged 65 years and older live in residential care settings (CSO, 2017).

Institutionalisation of older people with dementia is often related to behavioural symptoms (Testad *et al.*, 2007). In 1996, Chou *et al.* defined aggressive behaviour, which may be verbal or physical, as behaviour that harms or threatens another individual. Disturbed or aggressive behaviour is one of the most challenging issues facing staff working with older patients in long-term care facilities (Whall *et al.*, 1992; Voyer *et al.*, 2005; Cubit *et al.*, 2007)

While there is a lack of a consensus definition for VDB (Dwyer & Byrne, 2000; Von Gunten *et al.*, 2008), VDB is still the most widely accepted term in the literature referring to vocal or verbal behaviours that are disruptive, repetitive, or inappropriate to the situations in which they occur (Cohen-Mansfield & Werner, 1997). These behaviours may consist of repetitive and persistent words or phrases and include swearing, bizarre noises, and grunting (Nagaratnam *et al.*, 2003). Screaming may be the most common presentation (Locke & Mudford, 2010).

VDB can also be grouped into aggressive and non-aggressive behaviours. Verbal aggressive behaviours include screaming, making verbal sexual advances and cursing or verbal aggression. Verbal non-aggressive behaviours include uttering repetitive sentences and questions, making strange noises, complaining, negativism, and constant unwarranted requests (Cohen-Mansfield *et al.*, 1989; Beck *et al.*, 2011).

VDB is common among elderly people with dementia but is not exclusive to this patient group. The majority of

*Address for correspondence: Dr C. Nwogbunyama, MRCPsych, West Blanchardstown Mental Health Service, Blanchardstown Primary Care Centre, Grove Rd, Blanchardstown, Dublin 15, Ireland.
(Email: winniejnr2000@yahoo.com)

disruptive vocalisations in older adults are associated with dementia of Alzheimer's or vascular origin (Cohen-Mansfield *et al.*, 1990; Cariaga *et al.*, 1991) but also occur in other conditions such as intellectual disability (Matson *et al.*, 2011), psychotic depression, personality disorders (Sloane *et al.*, 1997), and autistic spectrum disorders (Lanovaz *et al.*, 2011). Repetitive vocalisation has also been reported in acquired brain injury, frontal lobe impairments (Sloane *et al.*, 1997), and patients with epilepsy (Enatsu *et al.*, 2011).

Estimates of the prevalence of VDB in nursing home residents vary between 10% and 40% (Cohen-Mansfield *et al.*, 1990; Cariaga *et al.*, 1991; Sloane *et al.*, 1997; Voyer *et al.*, 2005; Von Gunten *et al.*, 2008). Rovner *et al.* (1986) found 'noisiness' and 'verbal aggression' in 24% and 26% of nursing home residents respectively. Cohen-Mansfield studied 66 nursing home residents and found that 14% presented with strange noises and screams, 52% with verbal aggression or cursing, and 62% with repetitive sentences, constant unwarranted requests for attention or asking questions (Cohen-Mansfield, 1986).

Some other studies including those of Cariaga *et al.* (1991) and Friedman *et al.* (1992) have found that a substantial minority (11%) of nursing home residents exhibit VDB. The lack of a consensus definition of VDB may account for the variability in prevalence. To date, there have been no studies of prevalence of VDB in nursing home residents in Ireland although clinicians who visit patients in these settings readily attest to the frequency of the problem.

Despite a lack of consensus definition of VDB, there is a broad consensus that VDB is common and challenging to manage. There is, however, a paucity of data guiding appropriate intervention (Cohen-Mansfield & Werner, 1997; Von Gunten *et al.*, 2008). Contributory factors are diverse and invariably suggest that an array of different interventions need to be tailored to the individual's needs (Von Gunten *et al.*, 2008).

Adverse consequences of VDB include increased anxiety and overwhelming distress in the resident as well as other persons in their environment (Burgio *et al.*, 1996). This can lead to social isolation (Draper *et al.*, 2000) and over-use of medication (Cariaga *et al.*, 1991).

We aimed to study VDB in nursing home residents in Ireland and we hypothesised that VDB is a result of complex interaction between organic and environmental factors, a better understanding of which might guide interventions.

Methods

Setting

The target population for this study were the residents of 35 nursing homes in south county Dublin, Ireland.

All 35 nursing homes were contacted and provided with information about the research. Eight nursing homes did not respond to invitation to participate in the study and eight chose not to participate, of which one cited data protection concerns. As a result, 19 nursing homes took part in the study. At each nursing home, managers and nursing staff provided a list of residents who met study inclusion criteria.

Recruitment

Inclusion criteria in this study were that the residents must be at least 65 years old and exhibit VDB at least once per week to an extent that required active consideration or intervention (Chou *et al.*, 1996). Examples of VDB include persistent moaning, abusive language, screams, and repetitive verbalisations. VDB were reviewed in detail with each interviewee (nursing staff). Following collection of data on residents who met study inclusion criteria, nursing home staff were asked to randomly select residents who were at least 65 years of age and with similar demographics but who did not exhibit VDB (controls). Overall, we included 66 nursing home residents in the study, of whom 35 exhibited VDB and 31 were controls.

Assessments

Staff questionnaire

A structured questionnaire was developed to gather information from staff on VDB and other problematic behaviours. This was administered to the nurses who were most familiar with the residents in a structured interview process with the first author. Twenty-three nurses were interviewed, all of whom had training in behavioural and psychological symptoms of dementia. Interviews took 15–30 minutes each and included information about the typology of VDB, frequency and duration of episodes, and potential precipitating or antecedent factors. Information on diagnoses, medications, specialists involved in care, and medication history were obtained from medical records.

From both interviews and medical records, information was gathered on pharmacological and non-pharmacological management of VDB. The perceived efficacy of management approaches was evaluated by nursing staff using a three-point Likert scale: not effective, sometimes effective, and often effective (Cariaga *et al.*, 1991).

Assessment of agitation

Nursing staff were asked to complete Cohen-Mansfield Agitation Inventory (CMAI) (Cohen-Mansfield *et al.*, 1989). This inventory lists common physical and verbal aggressive and non-aggressive behaviours. Nurses

were asked to rate each behaviour based on the average frequency of occurrence over the preceding 2 weeks, with frequencies ranging from 'never' to 'several times an hour'.

Assessment of cognitive function

Results of Mini-Mental State Examinations (MMSE) completed by occupational therapists and trained nurses in the 6 months preceding each interview were collected.

Assessment of activities of daily living

Barthel index of Activities of Daily Living was completed with nursing staff during the interview (Dwyer & Byrne, 2000; Collin *et al.*, 1988). This is an assessment of mobility and self-care activities of daily living suitable for use in older people who are residents in long-stay care settings. Nurses were asked to rate each residents' ability to self-care in relation to feeding, toilet use, bowels, bladder, grooming, toilet use, mobility, dressing, and bathing. Scoring is based on the sum of the resident's score on each item with total scores ranging from 0 to 20. Higher scores reflect greater independence with self-care.

Statistical analysis

Data were stored, described, and analysed using IBM SPSS Statistics 23. For bi-variable analysis, we used the Student *t*-test and Chi square test, as appropriate. For multi-variable analysis, we generated a binary regression model with whether or not the resident was vocally disruptive (yes/no) as the dependent variable. Only variables significantly associated with being vocally disruptive on bi-variable analysis were included as independent variables in the multi-variable model (i.e. a diagnosis of dementia, lower MMSE scores, lower Barthel Index scores, and higher Cohen-Mansfield scores for physical agitation).

Ethics

Prior to commencement, this study was ethically approved by University College Dublin (UCD) Office of Research Ethics.

Results

Sample characteristics

Across the 19 participating nursing homes, 35 residents (8.2%) were identified as displaying VDB. Screaming was the most commonly reported VDB ($n = 26$; 39.4%), followed by repetitive verbalisation ($n = 24$, 36.4%), abusive language ($n = 22$; 33.3%), moaning ($n = 10$; 15.2%), and others ($n = 2$; 3.0%), (Table 1). In

Table 1. *Typology of VDB and their relative frequencies*

Type	Number of subjects ($n = 35$)	Percent (%)[a]
Screams	26	39.4
Repetitive verbalization	24	36.4
Abusive language	22	33.3
Moaning	10	15.2
Others	2	3.0

[a] More than one category could be scored. Thus, total percentage greater than 100.

60% ($n = 21$) of vocally disruptive residents, the behaviour occurred daily; for the remainder (40%; $n = 14$) it was less frequent. Episodes of VDB typically lasted for fewer than 30 minutes in three quarters of vocally disruptive residents (77.1%; $n = 27$) but lasted for longer in over a fifth ($n = 8$).

Vocally disruptive residents did not differ from those who were not vocally disruptive in terms of gender (56.9% and 40.0% female and male respectively; Chi square 1.323; $p = 0.378$), mean age (85.9 years, standard deviation [S.D.] 9.0 and 84.4, S.D. 7.6; $t = 0.761$; $p = 0.449$) or marital status (54.3% and 54.8% widowed respectively; Chi square 3.825; $p = 0.281$).

Almost one-third of all residents ($n = 20$; 30.3%) were diagnosed with a medical disorder only; 1.5% ($n = 1$) with a psychiatric disorder only; 22.7% ($n = 15$) with medical and surgical disorders; 22.7% ($n = 15$) with medical and psychiatric disorders; 19.7% ($n = 13$) with medical, surgical and psychiatric disorders; and 3.0% ($n = 2$) with none of these disorders; these proportions did not differ between residents who were and were not vocally disruptive (Chi square 7.997; $p = 0.156$). Almost half of residents (43.9%; $n = 29$) had an affective disorder but there was no significant difference between the two groups with regard to recorded mental disorders.

On review of medical records, dementia was recorded more commonly among vocally disruptive residents compared to non-vocally disruptive residents (94.3% and 67.7% respectively; Chi square 7.786; $p = 0.005$). Of the residents with a documented diagnosis of dementia ($n = 54$), almost one-third (31.5%; $n = 17$) had vascular dementia; 24.1% ($n = 13$) had Alzheimer's dementia; 7.4% ($n = 4$) had mixed vascular and Alzheimer's dementia; 3.7% ($n = 2$) had other dementias; and 33.3% ($n = 18$) had dementia without a specific sub-type diagnosed; these proportions did not differ between residents who were and were not vocally disruptive (Chi square 6.016; $p = 0.198$).

Table 2. *MMSE subscale scores*

MMSE subscale	All residents ($n = 62$) Mean (S.D.)	Vocally disruptive ($n = 33$) Mean (S.D.)	Non-vocally disruptive ($n = 29$) Mean (S.D.)	t	p
Spatial orientation	1.2 (1.5)	0.5 (0.8)	2.0 (1.7)	−4.294	<0.001
Temporal orientation	0.5 (1.2)	0.1 (0.4)	1.1 (1.5)	−3.444	<0.001
Registration	1.1 (1.4)	0.7 (1.2)	1.7 (1.5)	−2.822	0.001
Attention	1.0 (1.7)	0.4 (1.2)	1.6 (2.0)	−2.889	<0.001
Recall	0.4 (1.0)	0.1 (0.6)	0.3 (1.0)	−2.535	<0.001
Naming	0.9 (0.9)	0.6 (1.2)	0.9 (1.0)	−2.604	0.329
Repetition	0.3 (0.5)	0.2 (0.4)	0.4 (0.5)	−1.705	0.004
Three stage command	1.2 (1.3)	0.8 (1.2)	1.7 (1.3)	−2.879	0.220
Written instruction	0.4 (0.5)	0.3 (0.5)	0.5 (0.5)	−1.186	0.070
Sentence	0.3 (0.4)	0.2 (0.4)	0.4 (0.5)	−1.728	0.001
Copy	0.1 (0.3)	0.3 (1.2)	0.2 (0.4)	−1.832	0.750
Total score	7.3 (8.5)	3.9 (5.6)	11.1 (9.7)	−3.548	0.001

Almost one-quarter (24.2%; $n = 16$) of residents had hearing impairment; 45.5% ($n = 30$) had visual impairment; and 24.4% ($n = 16$) had speech impairment; these proportions did not differ between residents who were and were not vocally disruptive (Chi squares 2.095, 0.894, and 0.088, respectively; $p > 0.05$ in all cases).

Almost half of residents ($n = 31$; 47.0%) had pain. One-third ($n = 22$; 33.3%) were immobile; 40.9% ($n = 27$) were mobile with assistance; and 25.8% ($n = 17$) were independently mobile; these proportions did not differ between residents who were and were not vocally disruptive (Chi squares 0.047 and 1.793 respectively; $p > 0.05$ in all cases).

Cognitive and personal function

The mean MMSE score for vocally disruptive residents (3.9, S.D. 5.6) was significantly lower than that for non-vocally disruptive residents (11.1, S.D. 9.7; $t = −3.548$; $p = 0.001$), indicating lower cognitive function in vocally disruptive residents. Vocally disruptive residents scored significantly lower than non-vocally disruptive residents on all MMSE subscales except for naming, three-stage command, following written instruction, and copying intercepting pentagons (Table 2).

The mean Barthel Index score for vocally disruptive residents (5.9, S.D. 4.4) was significantly lower than for non-vocally disruptive residents (9.0, S.D. 6.4; $t = −2.267$, $p = 0.028$), indicating lower physical and self-maintenance function in vocally disruptive residents.

The mean CMAI score was significantly higher in vocally disruptive residents (62.9, S.D. 21.9) than in non-vocally disruptive residents (32.1, S.D. 9.7; $t = 7.529$, $p > 0.001$), indicating greater behavioural disturbance

among vocally disruptive residents (Table 3). Vocally disruptive residents scored higher than non-vocally disruptive residents on all verbal and physical items on CMAI, and on total score for physical agitation (mean total scores for physical agitation items: 38.2, S.D. 12.5 and 23.6, S.D. 6.5, respectively; $t = 5.960$, $p < 0.001$).

Management of vocally disruptive behaviour

Majorities of vocally disruptive (57.1%; $n = 20/35$) and non-vocally disruptive residents (54.8%; $n = 17/31$) were resident in nursing homes with more than 50 residents; these proportions did not differ between the two groups (Chi square 0.068, $p = 0.995$). All staff members interviewed had completed training in management of behavioural and psychological symptoms of dementia (100.0%, $n = 66$).

Expressing a need was reported by staff as the most common precipitant of VDB ($n = 23$; 65.7%) followed by another patient being noisy ($n = 17$; 48.6%), bathing ($n = 15$; 42.9%), being transferred or moved ($n = 13$; 37.1%), before meals ($n = 12$; 34.3%), during meals ($n = 12$; 34.3%), before bathing ($n = 11$; 31.4%), upon wakening ($n = 10$; 28.6%), before bedtime ($n = 10$; 28.6%), when others are approaching ($n = 10$; 28.6%), after meals ($n = 9$; 25.7%), after bathing ($n = 8$; 22.9%), before medication ($n = 6$; 17.1%), and after medication ($n = 3$; 8.6%). In 11 (31.4%), there was no discernible pattern reported.

The interventions most commonly used to manage VDB as reported by nursing staff included one-to-one attention and engaging the resident in conversation ($n = 35$; 100%), redirection of behaviour by talking ($n = 35$; 100%), moving to a quiet environment ($n = 34$; 97.1%), physical contact like holding the resident's

Table 3. *Cohen-Mansfield agitation inventory scores*

CMAI-short	All residents ($n = 62$) Mean (S.D.)	Vocally disruptive ($n = 35$) Mean (S.D.)	Non-vocally disruptive ($n = 31$) Mean (S.D.)	t	p
Physical/Aggressive					
Hitting	1.5 (0.8)	1.7 (1.0)	1.2 (0.4)	3.157	<0.001
Kicking	1.4 (0.8)	1.5 (0.7)	1.3 (0.8)	1.007	0.245
Grabbing	2.0 (1.4)	2.7 (1.5)	1.2 (0.7)	5.064	<0.001
Pushing	1.5 (1.0)	1.8 (1.2)	1.2 (0.7)	2.553	<0.001
Throwing things	1.5 (1.1)	1.9 (1.4)	1.1 (0.6)	3.089	<0.001
Biting	1.1 (0.3)	1.1 (0.4)	1.0 (0.0)	1.675	0.001
Scratching	1.4 (0.9)	1.5 (1.0)	1.2 (0.7)	1.801	0.003
Spitting	1.2 (0.9)	1.5 (1.2)	1.0 (0.0)	2.312	<0.001
Hurting self or others	1.4 (0.7)	1.3 (0.7)	1.2 (0.7)	0.511	0.399
Tearing things or destroying property	1.3 (0.9)	1.5 (1.2)	1.1 (0.2)	2.309	<0.001
Making physical sexual advances	1.2 (0.9)	1.3 (1.2)	1.0 (0.0)	1.435	0.005
Physical/Non aggressive					
Pace, aimless wandering	2.0 (1.9)	2.7 (2.3)	1.3 (1.0)	3.182	<0.001
Inappropriate dress or disrobing	1.2 (0.9)	1.4 (1.1)	1.0 (0.0)	2.214	<0.001
Trying to get to a different place	1.9 (1.7)	2.5 (2.1)	1.2 (0.5)	3.708	<0.001
Intentional falling	1.0 (0.2)	1.1 (0.2)	1.0 (0.2)	0.486	0.399
Eating or drinking inappropriate substances	1.2 (0.7)	1.3 (1.0)	1.0 (0.0)	1.930	<0.001
Handling things inappropriately	1.3 (0.9)	1.5 (1.0)	1.1 (0.7)	1.767	0.007
Hiding things	1.2 (0.7)	1.3 (0.7)	1.1 (0.7)	0.712	0.224
Hoarding things	1.1 (0.3)	1.1 (0.4)	1.0 (0.0)	1.966	<0.001
Performing repetitive mannerisms	2.4 (1.9)	3.4 (2.0)	1.2 (0.8)	5.944	<0.001
General restlessness	2.5 (2.0)	3.7 (2.1)	1.2 (0.6)	6.748	<0.001
Verbal/Aggressive					
Screaming	2.7 (2.1)	4.2 (1.9)	1.1 (0.2)	9.729	<0.001
Making verbal sexual advances	1.1 (0.4)	1.1 (0.5)	1.0 (0.0)	1.276	0.016
Cursing or verbal aggression	2.4 (2.0)	3.5 (2.1)	1.1 (0.4)	6.631	<0.001
Verbal/Non-aggressive					
Repetitive sentence or questions	3.1 (2.3)	4.7 (2.0)	1.3 (1.0)	9.040	<0.001
Strange noises	2.1 (2.0)	2.8 (2.2)	1.4 (1.3)	3.383	<0.001
Complaining	2.1 (1.9)	2.9 (2.3)	1.2 (0.6)	4.404	<0.001
Negativism	2.1 (1.9)	2.9 (2.3)	1.2 (0.6)	4.247	<0.001
Constant unwarranted request for attention or help	2.5 (2.2)	3.7 (2.4)	1.2 (0.8)	5.750	<0.001
Total score	48.4 (23.1)	62.9 (21.9)	32.1 (9.7)	7.529	<0.001

hands ($n = 34$; 97.1%), access to preferred activities ($n = 32$; 91.4%), re-positioning ($n = 31$; 88.6%), psychotropic medication ($n = 30$; 85.7%), and others ($n = 5$; 14.3%) (Table 4). Among these interventions, psychotropic medication was the most consistently useful for individual episodes, with nurses reporting it to be 'sometimes effective' in 40% of residents and 'often effective' in 56.7%. Attention, conversation and verbal redirection were the next most effective interventions reported.

A range of medications were used for the management of VDB including, most commonly, analgesia ($n = 23$, 65.7%), quetiapine ($n = 22$, 62.9%), memantine ($n = 13$, 37.1%), and sertraline ($n = 13$, 37.1%) (Table 5). Nurses reported that analgesia was either 'sometimes' or 'often effective' in 82.6% of residents; quetiapine in 77.2% for individual episodes of VDB. Furthermore, the perception among nurses was that analgesics, quetiapine, sertraline, mirtazapine, and memantine were most effective overall but not necessarily for managing individual episodes of VDB.

Almost two-third of residents with VDB ($n = 23$, 65.7%) had been referred to psychiatry of old age services for further assessment or management; those

Table 4. *Intervention utilised for vocally disruptive behaviours and perceived efficacy as reported by staff[a]*

Intervention	Not effective	Sometimes effective	Often effective
Attention and conversation ($n = 35$)	6 (17.1%)	17 (48.6%)	12 (34.3%)
Verbal redirection ($n = 35$)	11 (31.4%)	18 (51.4%)	6 (17.1%)
Physical contact ($n = 34$)	13 (38.2%)	10 (29.4%)	11 (32.4%)
Ignoring ($n = 9$)	8 (88.9%)	1 (11.1%)	–
Moving to a quiet environment ($n = 34$)	11 (32.4%)	18 (52.9%)	5 (14.7%)
Repositioning ($n = 31$)	23 (74.2%)	6 (19.4%)	2 (6.5%)
Access to preferred activities ($n = 32$)	15 (46.9%)	11 (34.4%)	6 (18.8%)
Psychotropic medications ($n = 30$)	1 (3.3%)	12 (40.0%)	17 (56.7%)
Others ($n = 5$)	1 (20.0%)	2 (40.0%)	2 (40.0%)

[a] More than one category could be scored. Thus total percentage greater than 100.

Table 5. *Reported effectiveness of medication used for the management of vocally disruptive behaviours in Irish nursing homes[a]*

Medication	Not effective	Sometimes effective	Often effective
Analgesic ($n = 23$)	4 (17.4%)	10 (43.5%)	9 (39.1%)
Citalopram ($n = 2$)	1 (50%)	–	1 (50%)
Sertraline ($n = 13$)	–	1 (7.7%)	12 (92.3%)
Mirtazapine ($n = 7$)	–	–	7 (100%)
Venlafaxine XL ($n = 4$)	1 (25.0%)	1 (25.0%)	2 (50.0%)
Trazadone ($n = 9$)	2 (22.2%)	2 (22.2%)	5 (55.6%)
Haloperidol ($n = 1$)	–	–	1 (100%)
Risperidone ($n = 8$)	3 (37.5%)	–	5 (62.5%)
Quetiapine ($n = 22$)	5 (22.7%)	3 (13.6%)	14 (63.6%)
Olanzapine ($n = 3$)	2 (66.7%)	1 (33.3%)	–
Gabapentin ($n = 3$)	1 (33.3%)	1 (33.3%)	1 (33.3%)
Diazepam ($n = 4$)	–	2 (50.0%)	2 (50.0%)
Alprazolam ($n = 9$)	3 (33.3%)	2 (22.2%)	4 (44.4%)
Lorazepam ($n = 3$)	2 (66.7%)	–	1 (33.3%)
Memantine ($n = 13$)	–	2 (15.4%)	11 (84.6%)
Rivastigmine ($n = 2$)	–	–	2 (100%)
Donepezil ($n = 6$)	1 (16.7%)	2 (33.3%)	3 (50.0%)

[a] More than one category could be scored. Thus total percentage greater than 100.

referred were younger than those who were not (mean ages 83.3 years, S.D. 8.8 and 90.4, S.D. 6.9, respectively; $t = 2.720$, $p = 0.010$) but the two groups did not differ in terms of gender, presence or absence of dementia, Barthel Index scores, MMSE scores, or Cohen-Mansfield Agitation scores ($p > 0.05$ in all cases).

Multi-variable analysis of independent correlates of vocally disruptive behaviour

For multi-variable analysis, we generated a binary regression model with whether or not the resident was vocally disruptive (yes/no) as the dependent variable. Variables significantly associated with VDB on bi-variable analysis were included as independent

variables in the multi-variable model; that is, having a diagnosis of dementia, lower MMSE scores, lower Barthel Index scores, and higher Cohen-Mansfield scores for physical agitation. Of these, only a higher Cohen-Mansfield score for physical agitation and a diagnosis of dementia were significantly and independently associated with vocally VDB in the multi-variable model (Table 6). Together, these two variables accounted for 65.6% of the variability in VDB between residents.

Discussion

This is the first study in Ireland to look at the prevalence and risk factors for VDB in nursing home residents. We

Table 6. *Multi-variable logistic regression analysis of correlates of vocally disruptive behaviour in nursing home residents in Ireland*

Variable	β	Standard error	p
Diagnosis of dementia	−5.060	2.460	0.040
MMSE score	0.104	0.066	0.116
Barthel index score	−0.030	0.073	0.674
Cohen-Mansfield score for physical agitation	−0.239	0.076	0.002

Binary regression model with whether or not the resident was vocally disruptive (yes/no) as the dependent variable; $r^2 = 65.6\%$; $p < 0.001$.

found a lower prevalence of VDB in our study (8.2%) than equivalent studies elsewhere 10–40% (Rosin, 1977; Cariaga *et al.*, 1991; Whall *et al.*,1992; Sloane *et al.*, 1998). Several factors may have contributed to this disparity. The definition of VDB used in our study is similar to that used by Cariaga *et al.* (1991) but it required the VDB to be of sufficient severity to be included in the person's care plan. While this is a practical and clinically orientated definition, it might have excluded VDB that was less disruptive and or repetitive (Von Gunten *et al.*, 2008). Studies with less restrictive definitions reported higher prevalence (Cohen-Mansfield, 1986).

Another potential reason for the apparently low prevalence of VDB in our study is that more residents in our study were receiving analgesia (66%) compared to those in a similar previous study (9%) (Cariaga *et al.*, 1991). The use of these medications may modify the severity and frequency of vocalisations (Testad *et al.*, 2007).

In addition, the majority of nursing homes in our study were smaller units that offered single-room accommodation to most residents and emphasised individualised care plans. The importance of the physical environment and carer training is supported by Sloane *et al.* (1998) and Testad *et al.* (2007) who found that quality of care by staff and the physical environment had close relationships with the behaviour of residents with dementia, as smaller units provided opportunity to manage VDB and possibly other forms of behavioural disturbance more effectively. It seems reasonable to suggest that patients with VDB who have single room accommodation can be managed more easily and that triggering of VDB in other residents may also be reduced.

Our study found that residents in nursing homes who exhibit VDB are more cognitively impaired and have higher rates of diagnosed dementia than those without VDB. Our study therefore supports previous findings of an inverse relationship between cognitive function and VDB (Beck *et al.*, 1998; Draper *et al.*, 2000; Dwyer & Byrne, 2000; Menon *et al.*, 2001;

Matteau *et al.*, 2003; Vance *et al.*, 2003; Cohen-Mansfield & Libin, 2005; Burgio *et al.*, 2007).

Data on relationships between VDB and age and gender varies. A number of studies have found that a typical nursing home resident who vocalises repetitively is female with advanced dementia (Cariaga *et al.*, 1991; Cohen-Mansfield & Libin, 2005). Some studies have made a distinction between aggressive and non-aggressive vocalisations with some studies finding the former more common in males (Beck &Vogelpohl, 1999; Eustace *et al.*, 2001; Zeisel *et al.*, 2003) and the later more common in females (Vance *et al.*, 2003; Burgio *et al.*, 2007). Our findings, however, did not support this stereotype and found no correlation between VDB and age, gender, or marital status. Our findings are supported by other studies in similar patients and suggest that, overall, age and gender are not relevant to VDB in nursing home residents (Keene *et al.*, 1999; Dwyer & Byrne, 2000; Eustace *et al.*, 2001; Schreiner, 2001; Pomara *et al.*, 2005; Testad *et al.*, 2007).

In our study, residents with VDB had lower mean Barthel Index score than those without VDB, indicating lower physical and self-maintenance function. This suggests that residents with VDB are more dependent and require more assistance with activities of daily living as reported in other studies (Cohen-Mansfield *et al.*, 1990; Cariaga *et al.*, 1991; Beck *et al.*, 1998; Draper *et al.*, 2000).

While nursing home staff in our study reported that screaming was the most common VDB, formal assessment using the CMAI found that repetitive sentences or questions were the most common verbal behaviours in our group; this, too, is consistent with previous studies (Testad *et al.*, 2007). Screaming was second most common VDB according to the CMAI. The discrepancy between staff interviews and the findings of the CMAI highlights the role of subjective impressions and the importance of using standardised measures such as the CMAI to gain a more comprehensive clinical picture of VDB.

Based on results of our study, VDB does not occur in isolation: residents with VDB scored higher in all verbal and physical items on CMAI and, therefore, showed

greater overall behavioural disturbance. This is consistent with the findings of Cariaga et al. (1991).

Expressing a need was the most commonly reported precipitant or antecedent factor for VDB, followed by vocalisation by another resident, consistent with previous studies (Cohen-Mansfield et al., 1990; Beck et al., 2011). A range of studies have found associations between VDB and levels of stimulation (both under- and over-stimulation) (Sloane et al., 1997; Von Gunten et al., 2011). Our study compares to these as we found that a high level of stimulation (e.g. vocalisation by other residents) may contribute to the occurrence of VDB.

Some studies have reported that aggressive behaviour in nursing homes is associated with depression, delusions, hallucinations, and constipation (Leonard et al., 2006). While we did not explore this in our study, future work could incorporate assessment of these parameters to determine whether or not they are associated with VDB. There was low recording of mental disorders in our study and, thus, a possible underestimation of their impact in contributing to VDB in vulnerable residents. Low recording may be as a result of low detection of mental disorders in nursing homes residents (Burrows et al., 1995; Teresi et al., 2001; Cohen et al., 2003; Gruber-Baldini et al., 2005). In 2000, Bagley et al. found rate of recognition of depression by nursing and other care staff in long-term care facilities to be as low as 15–27%. Depression can be very difficult to detect in dementia and rating scales appropriate for this patient group, such as the Cornell Rating Scale for Depression could be used (Alexopoulos et al., 1988).

One-to-one attention, engaging the resident in conversation and redirecting the behaviour by talking were the interventions most commonly used. Use of psychotropic medications was the least common but was reported to be the most consistently useful, with 56% of nursing staff perceiving it to be effective in over half of residents with VDB. None of these interventions were considered by staff to be as highly effective as reported by Cariaga et al. (1991).

With VDB, intervention is complex and effects may be paradoxical. For example, although attention was reported as beneficial in VDB, it may also reinforce the behaviour (Cariaga et al., 1991) and although under-stimulation may contribute to VDB, isolating a vocally disruptive resident may still be necessary (Sloane et al., 1997), especially to minimise negative impacts on other residents (Bang et al., 2008). Nonetheless, the resultant under-stimulation may exacerbate the behaviour if compensatory measures are not provided.

Various non-pharmacological approaches to VDB have been described in the literature and are commonly used. These are divided into four major categories: emotion-oriented, behaviour-oriented, cognitive-oriented, and sensory stimulation interventions (Cohen-Mansfield, 2001; Douglas et al., 2004; O'Neil et al., 2011; Carrion et al., 2013). Non-pharmacological interventions should be tailored to the individual (Magri et al., 2007) and there is evidence that they have some effect on behavioural and psychological symptoms in dementia (Strøm et al., 2016), but evidence for an effect in VDB is limited.

Pharmacological interventions may become necessary when non-pharmacological approaches prove ineffective. Use of medications, especially psychotropics, can have negative effects and, in our study, medications were reported as effective in little more than half of residents. Antipsychotic use is especially complex in this population as it is associated with deterioration in cognitive functioning (Schneider et al., 2006), increased risk of cerebrovascular accidents, and higher mortality (Jeste & Lacro, 2000).

As a result, initiating psychotropic medication requires careful consideration of the risk-benefit profile in context of each individual resident. The ideal drug would effectively target VDB and have minimal interactions and side effects (Jeste & Lacro, 2000). Concerns regarding the adverse effects of antipsychotics and a lack of licenced medication in this area highlight a need to investigate alternative medications and treatment strategies. There is a dearth of evidence to support particular pharmacological approaches to managing VDB as majority of studies in this area are observational or case based reports (Sloane et al., 1997). Agents such as pregabalin might well prove effective; however, further work is needed (McCarthy et al., 2019). Therefore, there is a clear need for multi-centre studies examining this issue.

The literature suggests that pain and discomfort are commonly associated with VDB (Cohen-Mansfield et al., 1990). Although pain is often reported as linked with agitation, we found no difference in reported pain in residents with and without VDB in our study. This might be because pain was not formally measured in our study. It is also noteworthy that nurses reported analgesia to be the most frequently used medication and often effective in almost 90% of residents with VDB. The importance of assessing and effectively treating pain in this group cannot be over-emphasised (Ballard et al., 2011; Husebo et al., 2011). Formal measures of pain, such as the Mobilisation–Observation–Behaviou–Intensity–Dementia-2 (MOBID-2) pain scale (Husebo et al., 2014), have an important role in assessing whether or not pain may be contributing to VDB and whether, as a result, use of psychotropic medications could be reduced (Ballard et al., 2011; Husebo et al., 2011).

Our findings support the idea that the best approach to managing VDB is to view the behaviour as an expression of unrecognised, unmet care needs that can both precipitate and perpetuate VDB. This is a population with high care needs and high dependence on others owing to various physical and cognitive deficits, understanding residents' needs is a critical element of care.

Strengths and limitations

This study has several strengths. It addresses an understudied topic of clinical importance in a relatively neglected population: older adults in nursing homes. We assessed VDB in considerable details, noting its type, repetitiveness, intensity and, to some extent, context, as suggested by Von Gunten *et al.* (2008). Our multi-variable model had a relatively high r^2, at 65.6%, indicating that the two variables in our model (a higher Cohen-Mansfield score for physical agitation and a diagnosis of dementia) accounted for almost two-thirds of the variation in VDB between residents.

This study also has several limitations. Assessment of VDB was based on nursing home staff reports, rather than direct observation by researchers, which would be more time-intensive than was possible. For future research, a combination of staff reports with in-depth analysis of selected cases might be a more comprehensive but still pragmatic approach. Another limitation was a lack of formal assessment of sensory impairment and pain; scales such as the MOBID-2 pain scale (Wilson *et al.*, 1997), would add to future work. Finally, this study involved a single data collector (CN), which has both disadvantages and advantages in terms of validity, but has the merit of eliminating inter-rater differences in assessments.

Conclusions

VDB is a complex, difficult-to-manage behaviour that is seen in a significant proportion of nursing home residents. On multi-variable analysis, two-thirds of the variability in the distribution of VDB is accounted for by agitation and dementia. One-to-one attention, engaging in conversation and redirecting behaviour by talking to residents, as well as use of psychotropic medication, are reported as the most useful interventions. These approaches are 'sometimes' or 'often effective' in the great majority of residents with VDB. Analgesics are the medications most commonly used.

The study of VDB among the elderly is limited by the broad range of factors that contribute to this behaviour. Given the distress that different forms of VDB cause, future research could usefully focus on sub-groups of residents with specific problems (e.g. just screaming, or just VDB attributable to pain) and use standardised assessment protocols and tools to gain a better understanding of typology, intensity, frequency, and correlates of VDB.

It is both pragmatically and ethically difficult to conduct randomised controlled trials of treatments for VDB. As a result, a multi-centre approach may be needed in order to adequately power such studies and to navigate the complex ethical issues on a collaborative basis. Finally, there are clear needs for both specific tools to assess VDB and the establishment of a panel of experts to develop consensus guidelines on the definition, assessment, and treatment of this complex, distressing behaviour.

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