

## Aggressive behaviour of inpatients with acquired brain injury

Ada JM Visscher, Berno van Meijel, Joost J Stolker, Jan Wiersma and Henk Nijman

**Objective.** To study the prevalence, nature and determinants of aggression among inpatients with acquired brain injury.

**Background.** Patients with acquired brain injury often have difficulty in controlling their aggressive impulses.

**Design.** A prospective observational study design.

**Methods.** By means of the Staff Observation Aggression Scale-Revised, the prevalence, nature and severity of aggressive behaviour of inpatients with acquired brain injury was assessed on a neuropsychiatric treatment ward with 45 beds. Additional data on patient-related variables were gathered from the patients' files.

**Results.** In total, 388 aggressive incidents were recorded over 17 weeks. Of a total of 57 patients included, 24 (42%) patients had engaged in aggressive behaviour on one or more occasions. A relatively small proportion of patients ( $n = 8$ ; 14%) was found to be responsible for the majority of incidents ( $n = 332$ ; 86%). The vast majority of aggression incidents ( $n = 270$ ; 70%) were directly preceded by interactions between patients and nursing staff. In line with this, most incidents occurred at times of high contact intensity. Aggressive behaviour was associated with male gender, length of stay at the ward, legal status and hypoxia as the cause of brain injury.

**Conclusion.** Aggression was found to be highly prevalent among inpatients with acquired brain injury. The results suggest that for the prevention of aggression on the ward, it may be highly effective to develop individually tailored interventions for the subgroup with serious aggression problems.

**Relevance to clinical practice.** Insight into the frequency, nature and determinants of aggressive behaviour in inpatients with acquired brain injury provides nurses with tools for the prevention and treatment of aggressive behaviour.

**Key words:** aggression, behaviour observation, brain injury, nurses, nursing

Accepted for publication: 10 December 2010

### Introduction

Patients with acquired brain injury (ABI) often have difficulty in controlling their aggressive impulses (Fleminger *et al.* 2006). Aggressive behaviour has a negative impact on the opportunities for successful rehabilitation of these patients (Burke *et al.* 1988, Manchester *et al.* 1997). Family members

of patients with such injuries experience aggression as one of the most difficult and stressful consequences of the illness (Allen *et al.* 1994). Aggression can also threaten the physical and mental health of care givers and fellow patients (Nijman *et al.* 1997, 2005a, Rippon 2000). Finally, aggression incidents may also markedly increase the costs of care (Hunter & Carmel 1992, Hyde & Harrower-Wilson 1995), as staff may

**Authors:** *Ada JM Visscher*, MSc, RN, Scientific Nurse, Altrecht Institute for Mental Health Care, Vesalius, Centre for Acquired Brain Injury, Den Dolder and Research Group Mental Health Nursing, Inholland University of Applied Sciences; *Berno van Meijel*, PhD, Associate Professor in Mental Health Nursing, Research Group Mental Health Nursing, Inholland University of Applied Sciences; *Joost J Stolker*, PhD, MD, Medical Doctor and Medical Director, Arkin Institute for Mental Health Care, Amsterdam; *Jan Wiersma*, MD, Medical Doctor, UMC St. Radboud, Department of Psychiatry, Nijmegen and Private (Neuro) Psychiatric Practice, Arnhem; *Henk*

*Nijman*, PhD, Senior Researcher, Altrecht Institute for Mental Health Care, Division of Ortho and Forensic Psychiatry, Den Dolder and Professor of Forensic Psychology, Behavioural Science Institute (BSI), Radboud University, Nijmegen, The Netherlands

**Correspondence:** *Ada JM Visscher*, Scientific Nurse, Altrecht Institute for Mental Health Care, Vesalius, Centre for Acquired Brain Injury, Dolderseweg 164, 3734 BN Den Dolder, The Netherlands. Telephone: +31 302256340.

**E-mail:** a.visscher@altrecht.nl

fall ill, or even become unfit for their job as a consequence of the confrontation with aggression (Hunter & Carmel 1992). To illustrate this: about one out of every five psychiatric nurses indicated that they had been on sick leave at least once in the last year, as a result of workplace violence (Nijman *et al.* 2005a).

A review of the literature reveals that empirical studies on the nature and prevalence of aggressive behaviour from patients with ABI resulting from e.g. stroke, infection, tumour, alcohol and drugs abuse, or hypoxia, are scarce. In contrast, aggression following traumatic brain injury (TBI) has received more attention in the literature. For example, in using the Overt Aggression Scale (OAS) to document aggression, Tateno *et al.* (2003) found that 30 of 89 patients with TBI (34%) displayed aggressive behaviour in the six months after the injury had occurred. In another study with the OAS, Baguley *et al.* (2006) found aggressive behaviour to be present in 25% of 228 adults with moderate to severe TBI at different stages of their illness (i.e. 6, 24 and 60 months after discharge). Furthermore, the found prevalence statistics of aggression appear to vary considerably, depending on the study design, duration of the studies, studied populations, definitions used to define aggression and the criteria used to categorise people as being aggressive or not.

Another problem in aggression research may be that aggression is associated with multiple etiological and situational factors, which may limit generalisability between studies. For general psychiatric wards, a model is in use that integrates patient, staff and ward variables, to explain inpatient aggression (Nijman *et al.* 1999b, Nijman 2002). Such a model may also be of interest in explaining aggression of inpatients with ABI. The core variable in the model is the psychopathology of the patient that leads to admission to the psychiatric ward. This hospitalisation, however, inevitably introduces various new (situational) stressors on the patient, whereby the patient's perception and appraisal of these stressors plays a key role in whether or not he or she will become aggressive (Nijman *et al.* 1999b, Nijman 2002). In the brain injury literature, much attention indeed has focused on identifying underlying patient's determinants of aggression. 'Damage to anterior brain structures, especially orbitofrontal and ventromedial prefrontal cortices, and disruption to the connections between frontal brain and limbic structures' are described by Alderman (2007) as major determinants of aggression in this patient group. Other factors that are associated with aggression in patients with TBI, according to Tateno, are the following: presence of major depression, frontal lobe lesions, poor premorbid social functioning and a history of alcohol and substance abuse (Tateno *et al.*

2003). Baguley *et al.* (2006) found an association between aggressive behaviour among TBI survivors and depression, concurrent traumatic complaints, younger age at injury and low satisfaction with life. Furthermore, Alderman (2007) points to a relationship between severe symptoms of neurobehavioural disability and poor language function on the one hand, and physical aggression for inpatients with ABI on the other.

As far as environmental or situational factors are concerned, Pryor (2004) reported a range of variables that staff working with patients with ABI believe can trigger aggression in these patients. Among others, these concern the following: too much stimulation (for example, overcrowding on the ward), too much noise, too many restrictions such as locked doors, lack of space, lack of privacy and a lack of choices. Pryor (2004) also discussed several potential staff variables that may be associated with aggression of patients with ABI, including staff having an inflexible approach towards patients, as well as staff having inadequate communication styles (for example, talking too loud or asking too many questions). Alderman *et al.* (1999) demonstrated that an increase in expectations put on the patient was associated with an increase in aggressive behaviour. Indeed, several studies have indicated that an increase in rehabilitation demands on people with brain injury can lead to more aggression (Swan & Alderman 2004).

Considering the impact that aggression can have on the patient and his or her surroundings, more standardised research into the frequency and nature of aggressive behaviour of patients with ABI seems warranted. The aim of the current study is to gain more insight into the prevalence and nature of aggression incidents among inpatients with neurobehavioural or neuropsychiatric disorders resulting from ABI, as well as on the patient-related and situational determinants of aggression of these patients.

## Methods

### Setting and patient sample

Data collection was conducted at a specialised 45-bed postacute treatment centre for adult inpatients with ABI during 17 weeks. This specialised department is part of a large general psychiatric hospital in the Netherlands. The aims of hospitalisation at the ABI centre are establishing the (neuropsychiatric) diagnosis and providing long-term treatment of neuropsychiatric symptoms and rehabilitation. The current sample consisted of all inpatients in the centre during the study period. All included patients suffered from (severe) neurobehavioural and/or neuropsychiatric disorders

as a result of ABI. Patients suffering from dementia and other neurodegenerative disorders, patients with acute addiction problems, patients with severe premorbid personality disorders, patients with intellectual disabilities (IQ < 70), patients requiring complex somatic care and patients placed in seclusion because of severe acting-out behaviour were not eligible for admission to the specialised neuropsychiatric centre under study and are therefore not included in this study. The length of stay of patients in the centre varies from several weeks to several years with a maximum of 18 years.

The sample initially consisted of 58 patients, 29 of whom were part of the study group for the entire duration of the study (i.e. 17 weeks). Fifteen patients were discharged and 13 admitted during the course of the study. The study protocol was approved by the Scientific Committee and the Board of the hospital. Patients were informed about the study, and patients were not included in case of objection to participate in the study. One patient did not approve participation in the study. Therefore, the final study group consisted of 57 patients.

### Instruments

The Dutch version of the Staff Observation Aggression Scale-Revised (SOAS-R) was used to document the prevalence, nature and severity of aggression incidents (Palmstierna & Wistedt 1987, Nijman *et al.* 1999a, 2005b). This instrument is widely used in general psychiatric institutions and aims at monitoring both verbal and physically aggressive acts against objects, patients, staff or others (Nijman *et al.* 1999a, 2005b). The SOAS-R consists of five columns. Column 1 is used to record the triggers or situations that apparently led to the aggressive behaviour. Column 2 is used to record the means that were used by the patient during the aggression incident. These means can vary from exclusively verbal aggression, to all kinds of physically assaultive behaviours. In column 3, the target of the aggressive behaviour is documented. The aggressive behaviour can be targeted at 'nothing or nobody' in particular, at 'object(s)', at 'other patients', 'patient self', 'staff members' or 'other persons'. Column 4 of the SOAS-R is used to record the consequences for victims, which range from 'no consequences' to 'severe physical consequences that require treatment by a physician'. In the fifth and last column of the scale, the measures taken to stop or control aggressive behaviour are described, such as 'talking to the patient' to calm him or her down, to hold the patient with force to control the aggressive behaviour, or having to administer medication to prevent further aggression (Nijman *et al.* 1999a).

For rating the overall severity of aggressive incidents, severity scores are connected to the various items of this aggression scale. The incident's overall severity score is determined by adding up the score of each of the five columns of the SOAS-R form. In this way, the total aggression severity score per incident can vary from 0 (least severe form of aggression) to a maximum of 22 (most severe form of aggression; Nijman 1999). In studies on the SOAS interobserver reliability, Palmstierna & Wistedt (1987) initially found an intraclass correlation coefficient of 0.96 based on a study with case vignettes. Based on actual observations of aggression, Cohen's Kappa's vary between 0.61–0.74 (Nijman *et al.* 1997, Steinert *et al.* 2000). Given the considerable similarities between the SOAS and the SOAS-R, interobserver reliability can be expected to be rather similar. Studies addressing the concurrent validity of SOAS and SOAS-R severity scores all yielded significant results (i.e. the correlations with other aggression assessment tools varied from 0.38–0.81 (Nijman *et al.* 2005b).

Apart from the SOAS-R to document aggressive behaviour, the Mini-Mental State Examination (MMSE) was used to detect cognitive dysfunctions. This MMSE consists of two parts. The first part measures cognitive skills such as orientation, attention and concentration. The second part measures the ability to follow verbal and written commands. Its feasibility, reliability and validity have been rated as 'good' in empirical studies (Folstein *et al.* 1975, Molloy *et al.* 1991). A score below 25 indicates severe ( $\leq 9$  points), moderate (10–20 points) or mild (21–24 points) cognitive disorders. Furthermore, The Global Assessment of Functioning Scale (GAF scale) of the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) was used as a global measure for psychological, social and occupational functioning of the patients. The GAF scale is a numeric scale (0–100), where a lower score indicates a lower level of functioning.

### Data collection

During the 17-week study, staff at the brain injury centre recorded aggression incidents by means of the SOAS-R. Staff members had been instructed prior to the study how to use SOAS-R. During the study, the staff was coached and reminded regularly to complete SOAS-R registration forms in case they were confronted with or witnessed aggressive behaviour of one of their patients. Variables such as age, gender, legal status on admission, leaves outside the department, abuse of alcohol and/or drugs prior to admission, time elapsed from the development of the brain injury to the admission, duration of the admission, cause of brain injury,

GAF- and MMSE scores were collected from the medical records of the patients.

### Statistical analyses

First, the study data were analysed using simple descriptive statistics and univariate tests. For all statistical tests (i.e.  $\chi^2$ -tests, independent samples *t* tests), alpha was set at 0.05 (two tailed). To examine which factors were associated with aggression, we compared patients who had engaged in aggression on one or more occasions (i.e. the aggression group) with patients for whom no aggression incidents were documented (i.e. the non-aggression group). This was performed by means of the univariate statistical comparisons mentioned above, as well as by means of a logistic regression analysis where the significantly associated variables were entered in a regression model to examine the 'predictive' value for aggressive behaviour.

Within the aggression group, the nature of incidents of a 'high-frequency aggression group' and a 'low-frequency aggression group' was compared, where the 'high-frequency group' consisted of patients who were involved in aggressive behaviour 27 times or more, whereas the 'low-frequency group' had been aggressive on 'only' 10 occasions or less. This was performed as a limited number of patients turned out to be 'responsible' for more than 80% of incidents (see results section). The incidents of this subgroup were analysed separately, in an attempt to find specific clues for the prevention of such 'high-frequency' aggression.

## Results

### Background characteristics

The study group consisted of 57 patients. The description of the characteristics of the studied group is shown in Table 1.

### Prevalence of aggression

Of the 57 patients included in the current study, 24 (42%) had engaged in aggressive behaviour on one or more occasions. In total, 388 incidents were recorded during the study period. These 388 incidents during 17 weeks correspond to 28 incidents per bed per year as the occupancy rate of the ward was 95% during the study period. As the ward has 45 beds, the ward was dealing with an average of more than three aggression incidents per day. The incidents had an average SOAS-R severity score of 6.3 (SD 4.1; range 0–19). Two hundred and sixty incidents (67%) were 'minor' incidents (score < 9), while 128 incidents (33%) were

**Table 1** Characteristics of the studied group

Variable	M	SD	Range	<i>n</i>	%
Gender					
Male				41	72
Female				16	28
Age	49.2	10.5	24–73		
Time postinjury (years)*	6.6	7.1	0–34		
Brain injury					
Traumatic				10	18
Cerebrovascular				14	25
Accident					
Hypoxia caused by cardiac problems or near drowning				9	16
Alcohol and/or drugs related				6	11
Tumour				6	11
Infection				5	9
Other				7	12
GAF score	42	11.3	20–70		
MMSE score	22.5	4.8	13–30		
Duration of admission (years)	1.1	2.6	0–18		
Legal status					
Voluntarily				49	86
Involuntarily				8	14

GAF, Global Assessment of Functioning; MMSE, Mini-Mental State Examination.

\*In cases for which a definitive time postinjury does not exist (e.g. alcohol-related brain injury), calculations are based on the date when the conditions led to the involvement of the health system through related events.

classified as more 'severe', using a SOAS-R severity score of 9 and higher as a cut-off point. The 388 aggression incidents were reported by 48 different staff members. On average, eight incidents were reported per member of staff, with large variations between individual respondents (range 1–56).

### Nature of the aggression incidents

Table 2 provides an overview of the nature of the aggression incidents on the basis of the various SOAS-R categories. For 83% (*n* = 320) of aggression incidents, reporting staff specified what had triggered the aggressive behaviour. In 70% of the aggression incidents, the incident appeared to have been triggered by some form of direct interaction between patient and staff. To be more precise, 'patient being denied something' (*n* = 96; 25%), 'help with activities of daily living (ADL)' (*n* = 79; 20%) and patient being 'requested to do something' (*n* = 49; 13%) were the most listed immediate triggers of aggressive behaviour.

**Table 2** Nature of aggression incidents (*n* = 388) based on the SOAS-R

	Frequency	Percentage
Provocation ( <i>n</i> = 388)		
Patient being denied something	96	24.7
Help with ADL	79	20.4
No understandable provocation	65	16.8
Other patient(s)	30	7.7
Staff requiring patient to take medication	5	1.3
Missing value	3	0.8
Other cause		
Request to do something	49	12.6
Other interaction with nursing staff	24	6.2
Meals	16	4.1
Somatic complaints	7	1.8
Other provocations	14	3.6
Means used by the patient ( <i>n</i> = 388)*		
Verbal aggression	170	43.8
Parts of the body	165	42.5
Ordinary object	50	12.9
Dangerous object	1	0.3
Missing value	2	0.5
Target of aggression ( <i>n</i> = 388)		
Staff member(s)	287	74
Other patient(s)	43	11.1
Nothing/nobody	30	7.7
Object(s)	8	2.1
Other patient(s) + staff member(s)	7	1.8
Other person(s)	6	1.5
Object(s) + staff member(s)	5	1.3
Patient self	1	0.3
Missing value	1	0.3
Consequence for victim(s) ( <i>n</i> = 388)†		
No	258	66.5
Persons felt threatened	103	26.5
Pain < 10 minutes	6	1.5
Visible injuries	6	1.5
Damaged objects	1	0.3
Missing value	14	3.6
Measures to stop aggression ( <i>n</i> = 411)‡		
Talk to patient (not in combination with another measures)	148	38.1
None	73	18.8
Calmly brought away	71	18.3
Oral medication	35	9
Held with force	27	7
Time out (locked door)	7	1.8
Restraints	2	0.5
Other measures		
Nursing staff withdraws from the situation	13	3.4

Of the 388 aggression incidents, 170 (44%) concerned exclusively verbal aggressive behaviour, whereas some form of physically aggressive behaviour was observed in 216

**Table 2** (Continued)

	Frequency	Percentage
Assistance of colleagues	13	3.4
Patient was asked to leave	8	2
Others	14	3.6

SOAS-R, Staff Observation Aggression Scale-Revised.

\*In case of recording multiple means of the aggression per incidents, the mean with the highest severity score was registered in this table.

†In case of recording multiple consequences of aggression, the consequence with the highest severity score was registered in this table.

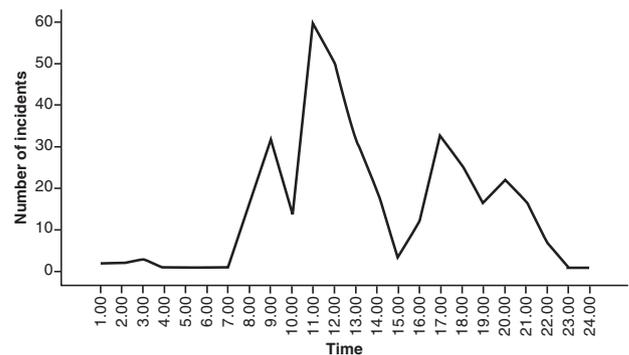
‡In 23 aggression incidents, multiple measures to stop the aggression were recorded.

incidents (56%). In the majority of incidents (*n* = 299; 77%), the aggression, whether verbal or physical, was directed against the staff. In most cases, the incidents had no direct consequences for the victims (*n* = 258; 67%). In 27% of incidents (*n* = 103), victims felt threatened, and in 3% (*n* = 12), violent acts resulted in pain or visible injuries of victims.

A broad range of measures were taken to stop the aggression. Talking to the patient (*n* = 148; 38%) was the most frequently used intervention to calm the patient down. More restrictive measures such as ‘held with force’, ‘time out (locked door)’ and ‘restraints’ were clearly less common (i.e. a total of 36 incidents or 9%).

### Temporal distribution of aggression incidents

Figure 1 shows the time of day when aggression incidents took place. The uneven distribution of aggression incidents over the hours of the day proved to be highly significant [ $\chi^2$  (23) = 401.83, *p* < 0.05]. Relatively, many incidents occurred around 9 AM (*n* = 31; 8%), between approximately 11 AM–2 PM (*n* = 161; 42%) and between 5 PM–6 PM (*n* = 58; 15%).



**Figure 1** Temporal distribution of aggression incidents.

### Determinants of aggression

No significant associations were found between aggressive behaviour on the one hand, and age, permission to leave the clinic without restrictions, and abuse of alcohol and/or drugs prior to admission, on the other. Time elapsed between the development of brain injury and the start of the study, and MMSE and GAF scores also did not turn out to be significantly associated with aggression.

Significant associations were found between aggression and gender, legal status on admission, duration of admission and hypoxia as the cause of the ABI. Male patients were significantly more aggressive than female patients [ $\chi^2(1) = 4.98, p < 0.05$ ]. Fifty-one per cent of the male patients ( $n = 21$ ) were part of the aggression group, compared with 19% of the female patients ( $n = 3$ ). Likewise, involuntarily admitted patients were substantially more likely to display aggressive behaviour (Fisher's exact test:  $\chi^2 = 7.87, p < 0.05$ ). Of the involuntarily admitted patients, 88% ( $n = 7$ ) were part of the aggression group compared with 35% of the voluntarily admitted patients ( $n = 17$ ). The duration of admission was significantly longer for patients in the aggression group, compared with patients in the non-aggression group (Mann Whitney  $U = 175.5, p < 0.05$ ). At completion of the study, patients from the aggression group had been in the hospital for an average of 2.5 years (range = 0.08–18.3; SD 3.8; median 1.15), whereas patients from the non-aggression group had a mean admission duration of 0.6 years (range = 0.02–2.5; SD 0.6; median = 0.42). Of the nine patients with hypoxia as cause of the brain injury, 78% ( $n = 7$ ) were part of the aggression group. In spite of the relatively small subsample for whom hypoxia was the cause of brain injury, this association with aggression was significant (Fisher's exact test:  $\chi^2 = 5.57, p < 0.05$ ).

These four variables (i.e. gender, legal status on admission, duration of admission and hypoxia) that were found to be significantly associated with aggression were analysed together in a logistic regression analysis to gain more insight into how (and to what extent) these variables could be useful to predict which patients are at a high risk of becoming aggressive. In Table 3, the coefficients and significances resulting from this analysis are presented. With the resulting regression model, 82% of the patients in our sample (i.e. 47 of the 57 patients) could be correctly classified as being aggressive or not. Both the sensitivity and the specificity of the model were rather substantial (i.e. 75% and 88%, respectively). In this model, where the four variables were analysed in combination with each other, gender seemed to have little incremental predictive power to add to the other three variables (i.e. legal status on admission, duration of

**Table 3** Coefficients and significances resulting from the logistic regression analysis where the four variables gender, legal status on admission, duration of admission and hypoxia were entered together

Variable	B	Exp(B)	Significance
Hypoxia	2.66	14.29	0.006
Duration of admission	1.45	4.28	0.012
Being involuntarily admitted	2.74	15.46	0.037
Gender	0.84	2.33	0.35
Constant	-3.28	0.38	0.001

admission and hypoxia). Indeed, a regression analysis where only these three latter variables were entered while gender was excluded, arrived at almost similar proportions of patients being classified correctly (i.e. 81% overall prediction; 75% sensitivity; 85% specificity).

### High- and low-frequency aggression patients

As mentioned earlier, one or more aggression incidents were recorded for 24 of the 57 patients. Eight of these 24 patients caused 86% of the aggression incidents, with an average of 2.5 incidents per week during admission (range = 1.5–3.9; SD = 0.93), which corresponds to an average of 131 incidents per patient per year (range = 80–202; SD 48.4). The other 16 patients of the aggression group caused 14% of the aggression incidents with an average of 0.2 incidents per week of admission (range = 0.06–0.68; SD 0.2), which corresponds to an average of 13 aggression incidents per patient per year (range = 3–35; SD 2 10.9).

A comparison was made between the nature and severity of incidents involving the eight 'high-frequency aggression patients' and the 16 'low-frequency aggression patients'. These analyses indicated that incidents caused by the eight 'high-frequency aggression patients' occurred significantly more often during assistance with ADL [ $\chi^2(1) = 8.64, p < 0.05$ ] than was the case with the 'low-frequency patients'. The 'low-frequency aggression patients' on the other hand displayed aggression relatively often that appeared to have been triggered by other patients' behaviour (Fisher's exact test:  $\chi^2 = 19.37, p < 0.05$ ). In line with this, the 'low-frequency aggression patients' directed their aggression relatively often against fellow patients [ $\chi^2(1) = 4.25, p < 0.05$ ]. No differences between the two groups were found in terms of 'means used' and 'consequence(s) for the victims'. Nor was the mean severity of incidents caused by the two groups significantly different.

MMSE scores were available for 61% of patients. As mentioned earlier, no significant difference in MMSE scores was found between aggressive and non-aggressive patients. However, in the aggression group, a significant difference in

average MMSE scores was found between the low-frequency and high-frequency aggression groups. Patients from the 'high-frequency aggression group' had a significantly lower MMSE score (mean score = 17.5; SD 2.5; range = 14–20, median = 18) than patients from the 'low-frequency aggression group' (mean score = 23.8; SD 3.5; range = 16–28, median = 25); Mann Whitney  $U = 4$ ,  $p < 0.05$ .

GAF scores were available for 95% ( $n = 54$ ) of patients. In line with the MMSE scores, a significant difference in average GAF scores between the low-frequency and the high-frequency aggression group was found. Patients from the 'low aggression group' had a significantly higher mean GAF score (mean = 45; range = 20–60; SD 10.4, median = 45) than patients from the 'high-frequency aggression group' (mean score = 31; range = 20–40; SD 6.4, median = 30); Mann Whitney  $U = 15.5$ ,  $p < 0.05$ .

## Discussion

This paper addresses the following three main issues: the frequency and nature of aggressive incidents of inpatients with ABI and the relationship between aggression and patients' characteristics. Of the 57 patients that were included in the current study, 42% had engaged in aggressive behaviour. This proportion appears to be somewhat high compared with percentages found in some earlier studies among patients with TBI. To be more precise, Tateno *et al.* (2003) found 34% of patients with TBI to be aggressive, whereas Baguley *et al.* (2006) reported a prevalence of 25%. Differences between studies, however, are likely to be connected to the study duration and to the choice of aggression registration method used.

By using the SOAS-R, a mean prevalence of 28 aggression incidents per bed per year was found in the current sample, with the mean SOAS-R severity score being 6.3. To compare, depending on the type of ward, patient group and country, in a review of earlier SOAS and SOAS-R studies (Nijman *et al.* 2005b), an annual number of incidents between 0.4–59.9 incidents per patient was found, with a mean value of 9.3 incidents per patient per year. The same review reported SOAS-R severity scores to generally lie between 9.2–11.0. Against that background, the prevalence of 28 incidents per bed per year in the current sample appears to be high, whereas the mean severity score of 6.3 indicates that the severity of the reported aggression incidents in general was low. Indeed, the proportion of incidents having physical consequences for victims was low (i.e. 3%).

This high prevalence and low severity score may be linked to the admission criteria of the ward in question. The ward, for example, excludes patients with acute addiction problems

and patients placed in seclusion because of severe acting-out behaviour. Addiction problems and seclusions are known to be associated with severe aggression. Indeed, in the current study, it was found that restrictive measures such as time out (locked door), the use of mechanical restraints or forced medication were not very common measures on the studied ward. Another explanation of the combination of high frequency with low average severity of aggression in the current study may be a very accurate logging of all aggression incidents by the staff, whether or not they were minor. The staff was reminded repeatedly during the study to record *all* aggressive behaviours. Because of this, they may have recorded relatively many 'minor' incidents with low severity, leading to a high prevalence of aggression with a relatively low mean severity score. The current study, however, has several obvious limitations. In addition, the small sample size ( $n = 57$ ) is susceptible to the effects of outliers, and the relatively high number of statistical tests increases the risk of finding associations by chance. For these reasons, the findings of the current study need to be interpreted with caution.

A further limitation of the study is that not all the factors causing aggression could be addressed. Aggression often arises from a combination of mutually influential factors. Nijman describes the influence and interactions of patient, staff and ward variables in triggering aggression on inpatient wards (Nijman 1999, 2002). This study mainly investigated patient variables, such as age, gender, legal status on admission, abuse of alcohol and/or drugs prior to admission. Regarding the associations between environmental/staff factors and aggression incidents, however, some interesting observations could be made in the current study. In 83% of the incidents staff specified what, in their opinion, had caused the aggression. Seventy per cent of the reported provocations were associated with some form of interaction between patient and nurse, such as requests of patients being turned down prior to aggressive behaviour or patients being assisted with ADL. In line with this, the vast majority (77%) of aggressive acts and behaviour were directed against staff members. Interestingly, a substantial difference in the number of registered incidents per staff member was found. This may possibly be connected to a better registration discipline of some nurses, but may also have to do with certain staff competencies and communication skills. Alternatively, the found differences in the number of reported incidents per staff member may be the result of how consistent nurses enforce treatment and nursing rules. Differences between staff members in limit setting may lead to some nurses refusing patients' requests more often than others. Alderman *et al.* (1999) found that aggression increased as nurses made more demands on patients in the course of the treatment. The

found uneven distribution of the number of aggression incidents over the hours of the day may also be associated with increased demands on patients at certain times of the day. Sixty-five per cent of the total number of incidents occurred around 9 AM, between 11 AM–2 PM and between 5 PM–6 PM. These times appear to be the hours of high contact intensity, often involving complex activities in the field of ADL, meals and household chores. For such activities, patients need to apply social, cognitive or practical skills in which they may find extremely difficult because of their neuropsychiatric symptoms, and the confrontation with their limitations may perhaps frustrate and anger them.

As 70% of the incidents were directly preceded by some form of interaction with staff, we feel that a great deal of attention should be paid to the way nursing staff communicates with patients, taking into consideration the cognitive impairments associated with the brain injury. An incorrect assessment of a patient's performance level, for example, may cause staff to have overly optimistic expectations and place too great a demand on the patient, which may in turn lead to aggression.

As to patient variables, significant associations were found between aggression and gender, duration of admission, legal status of patients and hypoxia as cause of the injury. With these variables, 82% of the current sample could be correctly classified as being aggressive or not. As in earlier study by Alderman *et al.* (2002), no significant relation was found between aggression and time since injury or age. This suggests that the impulse control problems stemming from ABI may be very enduring once they stretch beyond the more acute phase of the injury.

In line with the study conducted by Tateno *et al.* (2003), no significant difference was found between the mean MMSE scores of the aggression and non-aggression groups. However, significant differences were found between the mean MMSE and GAF scores for the eight patients causing most of the aggression incidents and the other 16 aggressive patients. This finding again seems to suggest that impaired cognitive functioning can trigger aggression from the frustration it may cause patients. The fact that a small group of patients were 'responsible' for the vast majority of incidents suggests that for the prevention of aggression on the ward, it may be highly effective to invest in individually tailored interventions for this limited subgroup. The high prevalence of aggression

incidents underlines the importance of conducting research into interventions aiming at reducing aggression from patients with acquired brain injuries.

## Conclusion

The prevalence of aggression in this study is relatively high compared with other studies with the SOAS-R. Forty-two per cent of the patients had engaged in aggressive behaviour at one or more occasions, but a relatively small proportion of the patients (14%) was found to be responsible for the majority (86%) of the incidents. At most incidents, the staff could specify a provocation for the aggression, and 70% of the incidents were preceded by an interaction between patient and nursing staff.

## Relevance to clinical practice

Non-pharmacological intervention strategies for individual (high risk) patients may possibly be developed further by analysing the nature and apparent triggers of aggression incidents of each patient separately. From the analyses of incidents of individual cases, in combination with the specific patient characteristics, such as the nature of their cognitive impairments, it may be possible to arrive at tailor made aggression prevention strategies.

## Acknowledgements

The authors thank the nursing staff at Vesalius, Centre for Acquired Brain Injury, for their accurate logging of aggression incidents.

## Contributions

Study design: AV, BvM, JW; data collection and analysis: AV, BvM, JJS, HN and manuscript preparation: AV, BvM, JJS, HN.

## Conflict of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

## References

- |  |   |  |
|--|---|--|
| <p>Alderman N (2007) Prevalence, characteristics and causes of aggressive behaviour observed within a neurobehavioural</p> | <p>rehabilitation service: predictors and implications for management. <i>Brain Injury</i> 21, 891–911.</p> | <p>Alderman N, Davies JA, Jones C &amp; McDonnell P (1999) Reduction of severe aggressive behaviour in ABI: case studies</p> |
|--|---|--|

- illustrating clinical use of the OAS-MNR in the management of challenging behaviours. *Brain injury* 9, 669–704.
- Alderman N, Knight C & Henman C (2002) Aggressive behaviour observed within a neurobehaviour service: utility of the OAS-MNR in clinical audit and applied research. *Brain injury* 16, 469–489.
- Allen K, Linn RT, Gutierrez H & Willer BS (1994) Family burden following traumatic brain injury. *Rehabilitation Psychology* 39, 29–48.
- Baguley LJ, Cooper J & Felmingham K (2006) Aggressive behaviour following traumatic brain injury: how common is common? *Journal of Head Trauma and Rehabilitation* 21, 45–56.
- Burke WH, Wesolowski MD & Lane I (1988) A positive approach to the treatment of aggressive brain injured clients. *International Journal of Rehabilitation Research* 11, 235–241.
- Fleminger S, Greenwood RJ & Oliver DL (2006) Pharmacological management for agitation and aggression in people with acquired brain injury. *Cochrane Database Systematic Reviews, Issue 4*, Art. No.: CD003299.
- Folstein MF, Folstein DF & McHugh PR (1975) Mini-mental state a practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research* 12, 189–198.
- Hunter M & Carmel H (1992) The cost of staff injuries from inpatient violence. *Hospital and Community Psychiatry* 43, 586–588.
- Hyde CE & Harrower-Wilson C (1995) Recourse consumption in psychiatric intensive care: the cost of aggression. *Psychiatric Bulletin* 19, 73–77.
- Manchester D, Hodginson A & Casey T (1997) Prolonged, severe behavioural disturbance following traumatic brain injury: what can be done? *Brain injury* 11, 605–617.
- Molley DW, Alemayehu E & Oberts R (1991) Reliability of a standardized mini mental examination compared with the traditional mini-mental state examination. *American Journal of Psychiatry* 148, 102–105.
- Nijman HLI (1999) *Aggressive Behavior of Psychiatric Inpatients Measurement, Prevalence and Determinants*. Dissertation, Maastricht University, Maastricht.
- Nijman HLI (2002) A model of aggression in psychiatric hospital. *Acta Psychiatrica Scandinavica* 106, 142–144.
- Nijman HLI, Merckelbach HLGJ, à Campo JLMG & Ravelli D (1997) Aggressive behavior on an acute psychiatric admissions ward. *The European Journal of Psychiatry* 11, 106–114.
- Nijman HLI, Muris P, Merckelbach H, Palmstierna T, Wistedt B, Vos AM & Rixtel van A (1999a) The staff observation aggression scale-revised (SOAS-R). *Aggressive Behavior* 25, 197–209.
- Nijman HLI, Campo àJ, Ravelli DP & Merckelbach HLCJ (1999b) A tentative model of aggression on inpatient psychiatric wards. *Psychiatric Services* 50, 832–834.
- Nijman HLI, Bowers L, Oud N & Jansen G (2005a) Psychiatric nurses' experiences with inpatient aggression. *Aggressive Behavior* 31, 217–227.
- Nijman HLI, Palmstierna T, Almvik R & Stolker JJ (2005b) Fifteen years of research with the Staff Observation Aggression Scale: a review. *Acta Psychiatrica Scandinavica* 111, 12–21.
- Palmstierna T & Wistedt B (1987) Staff observation aggression scale. Presentation and evaluation. *Acta Psychiatrica Scandinavica* 76, 657–663.
- Pryor TJ (2004) What environmental factors irritate people with acquired brain injury? *Disability & Rehabilitation* 26, 974–980.
- Rippon TJ (2000) Aggression and violence in health care professions. *Journal of Advanced Nursing* 31, 452–460.
- Steinert T, Wölfe M & Gebhardt RP (2000) Measurement of violence during inpatient treatment and association with psychopathology. *Acta Psychiatrica Scandinavica* 102, 107–112.
- Swan L & Alderman N (2004) Measuring the relationship between overt aggression and expectations: a methodology for determining clinical outcomes. *Brain Injury* 18, 143–160.
- Tateno A, Jorge RE & Robinson RG (2003) Clinical correlates of aggressive behavior after traumatic brain injury. *Journal of Neuropsychiatry and Clinical Neurosciences* 15, 155–160.

*The Journal of Clinical Nursing* (JCN) is an international, peer reviewed journal that aims to promote a high standard of clinically related scholarship which supports the practice and discipline of nursing.

For further information and full author guidelines, please visit JCN on the Wiley Online Library website: <http://wileyonlinelibrary.com/journal/jocn>

### Reasons to submit your paper to JCN:

**High-impact forum:** one of the world's most cited nursing journals and with an impact factor of 1.228 – ranked 23 of 85 within Thomson Reuters Journal Citation Report (Social Science – Nursing) in 2009.

**One of the most read nursing journals in the world:** over 1 million articles downloaded online per year and accessible in over 7000 libraries worldwide (including over 4000 in developing countries with free or low cost access).

**Fast and easy online submission:** online submission at <http://mc.manuscriptcentral.com/jcnur>.

**Early View:** rapid online publication (with doi for referencing) for accepted articles in final form, and fully citable.

**Positive publishing experience:** rapid double-blind peer review with constructive feedback.

**Online Open:** the option to make your article freely and openly accessible to non-subscribers upon publication in Wiley Online Library, as well as the option to deposit the article in your preferred archive.