International Psychogeriatrics, Vol. 14, No. 1, 2002, pp. 97-105

Elderly Patients With Deliberate Self-Poisoning Treated in an Australian General Hospital

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ABSTRACT. *Objective:* To examine the demographic, prescription, ingestion, and psychiatric diagnostic factors that distinguished elderly from nonelderly patients treated for deliberate self-poisoning (DSP). *Method:* A prospective case series study of 2,667 patients presenting to a regional referral center for poisoning (Newcastle Mater Hospital, NSW, Australia), January 1991 to July 1998. The sample was stratified into two groups, 65 years or greater (n = 110) and 64 years or less (n = 2,557) at the time of index admission. The groups were compared using a forward stepwise logistic regression model. Uncontrolled comparisons were analyzed by chi-square statistic with Bonferroni-adjusted p values and controlled comparisons by odds ratio (OR) with 95% confidence interval (CI). *Results:* The elderly group represented 4.1% of the total. The logistic regression analysis found the elderly DSP group was more likely to have a longer length of stay (OR 5.90, CI 3.87-9.00), to have been prescribed "other" drugs (neither benzodiazepines, mood treatment drugs, nor paracetamol) before admission (OR 5.32, CI 3.34-8.48), to have been prescribed benzodiazepines (OR 3.15, CI 2.03-4.89), and to be diagnosed with major depression (OR 2.17, CI 1.41-3.36) than the younger group. The elderly group was less likely to have ingested paracetamol (OR 0.28, CI 0.14-0.54) or "other" drugs (neither benzodiazepines nor mood treatment drugs) in the DSP episode (OR 0.33, CI 0.20-0.54). *Discussion*: Elderly DSP patients differ in several important respects from younger patients. They have higher morbidity as a result of the DSP. Major depression plays a more important role. The strong relationship between benzodiazepine prescription and DSP in the elderly raises questions and possible prevention strategies.

KEYWORDS: Suicide; self-poisoning; elderly; depression; deliberate self-harm; benzodiazepines; attempted suicide

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Despite increasing awareness of the problem of completed suicide in the elderly, the area of deliberate self-harm (DSH) in the same age group "remains surprisingly under-researched" (Nowers, 1997). In western countries, deliberate self-poisoning (DSP) is the most common form of DSH (Hawton & Fagg, 1990). This group is of interest because, with age, there is an increasing convergence between the characteristics of those who attempt and those who complete suicide (Frierson, 1991; McIntosh, 1992; Merrill & Owens, 1990). Elderly people have a high risk of making further attempts and completing suicide following initial DSP as well as a high mortality rate from other causes (Hepple & Quinton, 1997). The study of those who attempt suicide is useful because of the potential to prevent both DSH and elderly suicide.

Cases of elderly DSH account for around 5% of all self-harm admissions to general hospitals (Hawton & Fagg, 1990; Pierce, 1987; Sendbuehler & Goldstein, 1977). Factors associated with DSH in the elderly include being unmarried, widowed, and socially isolated. Major depression, hopelessness, and unresolved grief are related to DSP in the elderly, as is having a physical illness (Draper, 1994, 1996; Frierson, 1991; Merrill & Owens, 1990; Nieto et al., 1992; Pierce, 1996). The female:male ratio declines with age, moving close to parity (Hawton & Fagg, 1990).

Drug ingestion in DSP by elderly patients has been described in several studies, although few have examined the patterns of prescription and ingestion in comparison with a younger group (Draper, 1994; Hawton & Fagg, 1990; Merrill & Owens, 1990; Nieto et al., 1992). Benzodiazepines and other sedatives are more often ingested in DSP by the elderly (Nowers, 1993).

Draper (1996) has drawn attention to methodological difficulties in many studies identifying factors associated with DSH in the elderly. These included the lack of prospective data using standardized measures, the absence of diagnostic criteria for psychiatric diagnosis, and the absence of control groups. Another weakness identified by Draper was the reliance on patient groups referred for psychiatric opinion and therefore unrepresentative of hospital-treated populations. Few study designs have allowed direct comparisons between younger and older patients with DSP or utilized multivariate statistical analyses.

METHODS

We tested the hypothesis that elderly DSP patients could be characterized by a different pattern of demographic factors, drug prescription before DSP, drug ingestion during DSP, current psychiatric disorder, and medical morbidity and mortality following DSP compared with younger DSP patients in a hospital-treated case series.

Data Source

The Hunter Area Toxicology Service (HATS) at the Mater Misericordiae Hospital, Newcastle, Australia, has direct clinical responsibility for all adult poisoned patients in the Newcastle, Lake Macquarie, and Port Stephens local government areas. HATS also provides a secondary and tertiary referral service to the Upper Hunter. In 1996 (1996 Census of Population and Housing. Australian Bureau of Statistics. Canberra.

www.abs.gov.au), this represented a primary referral population of 366,296 (14.9% over 65 years) and combined population of 521,470 (13.7% over 65 years). The model of clinical service, research database, and method of data collection has been previously described (Buckley et al., 1995, 1996; Carter et al., 1999; Whyte et al., 1997).

HATS admitted all cases of DSP that presented to the Mater Hospital and undertook psychiatric assessment for all cases. Data were collected prospectively for patients with an index admission to the hospital between January 1991 and June 1998. These patients met a definition of DSP; "the deliberate ingestion of more than the prescribed amount of medicinal substances, or ingestion of substances never intended for human consumption, irrespective of whether harm was intended" (Bancroft et al., 1975). Exclusively recreational, iatrogenic, and accidental self-poisonings were excluded from the analyses. Drug prescription and drug ingestion data were determined by medical and toxicology staff from patient, family, ambulance, pharmacist, and treating doctor sources as appropriate. Medical morbidity variables including intensive care unit admission were determined from the record and coma level by medical staff assessment.

Psychiatric diagnoses were made according to DSM-III-R (American Psychiatric Association, 1987) (1991 to 1995) and DSM-IV (American Psychiatric Association, 1994) (1996 to 1998) criteria, following clinical assessment by psychiatrist, psychiatric trainee, or psychiatric clinical nurse consultant. These diagnoses were reviewed at a weekly meeting to achieve consensus diagnoses.

Study Factors

The variables considered in the analysis were:

Demographic: Gender and marital status (married or de facto vs. never married, divorced, separated, or widowed)

Prescription of drugs (pre-DSP), stratified into the following groups (and subgroups):

Benzodiazepines

Mood treatment drugs

- Tricyclics (TCA)
- Other antidepressants; selective serotonin reuptake inhibitors, monoamine oxidase inhibitors, reversible inhibitors of monoamine oxidase, serotonin, and norepinephrine reuptake inhibitors
- Anticonvulsants (carbamazepine, sodium valproate, clonazepam) and/or lithium

"Any other drugs" (other than those groups above)

Paracetamol

Other drugs

Ingestion of drugs at the index DSP episode: stratified as above but also alcohol

DSM disorders: Major depression, alcohol abuse, or alcohol dependence

Medical morbidity: Admitted to the intensive care or coronary care units, death, coma level (coma score 1-4 vs. alert, drowsy, or stuporous), arrhythmia, seizure, length of stay (stay in hospital more than 1 day vs. 1 day or less), discharged to psychiatric hospital.

Statistical Analysis

Bivariate analysis was used to examine the strength of association between age group and study factors. *P* values were calculated using the continuity-adjusted chi-square. Bonferroni adjustment for 30 tests of significance was made and set at the level of $p < .0015$ (Shott, 1990).

Multivariate Analysis

A multiple logistic regression model was fitted to explore the important, independent associations between age group and study factors after adjustment for confounding factors (Hosmer & Lemeshow, 1989). Variables with limited numbers in some cells were collapsed where possible as shown in Table 1. Tricyclic antidepressants, other antidepressants, and anticonvulsant drugs or lithium were grouped under the heading "mood drugs." For "drugs prescribed," paracetamol was included under "other drugs." Alcohol abuse (n = 12) and alcohol dependence (n = 3) were combined into one category. Coma level was excluded from the analysis because of the anticipated high level of confounding with intensive care unit admission. Variables excluded because of small cell sizes (n < 10) were arrhythmia, seizure, and death. All remaining factors with a univariate association with age group of p < .25 were considered for inclusion in the model. Alcohol abuse/dependence, prescription or ingestion of "mood treatment drugs," and gender were also included because they were of theoretical interest. A forward stepwise approach was used with variables entered into the model based on strength of association in the univariate analysis. Multicollinearity was examined using standard errors at each step. Log likelihood ratios were used to examine the contribution of each variable to the model and nonsignificant variables were excluded at each step. However, gender was retained in the model for theoretical interest, irrespective of statistical significance. Interactions between variables in the final model were tested if an interaction was anticipated a priori.

RESULTS

Study Sample

A total of 2,667 patients were admitted for first episode of treatment for DSP between January 1991 and June 1998. Of these, 110 (4.1%) were aged 65 years or over.

The annual rate of DSP averaged over the study period was 20-26 per 100,000 population for those over the age of 65, and 76-108 per 100,000 population under 65. The smaller figure in these ranges is the rate using the population in the entire tertiary referral area as the denominator and is therefore an underestimate. The larger figure is the rate for the primary referral catchment area.

Males over 65 had a rate of 19-25 per 100,000/year whereas the female rate in the same age group was 21-28. The rates for the younger group were 58-84 for men and 94-135 for women.

Univariate Analysis (Table 1)

Factors statistically significantly related to being in the elderly age group in the univariate analysis were: being married; prescription and ingestion of benzodiazepines; being prescribed "other" drugs; having major depression; coma; arrhythmia; a longer length of stay in hospital; and mortality. The average length of stay was 28.5 hours for the younger group and 89.6 hours for the older age group. Ingestion of paracetamol was less common in the older group.

TABLE 1. Bivariate Analysis: Factors Associated With Age Group Among Patients With Deliberate Self-Poisoning

Variable (N = 2,667)	Elderly (65+) (n = 110)		Younger (<65) (n = 2,557)		Odds Ratio	95% Confidence Interval	p
	n	%	n	%			
Demographics							
Female	66	60.0	1,563	61.1	1.0	0.7–1.4	.891
Married or de facto[a]	49	45.8	636	25.5	2.5	1.7–3.7	.001*
Drugs prescribed (pre-DSP)							
Benzodiazepines	68	61.8	654	25.6	4.7	3.2–7.0	.001*
Mood drugs	44	40.0	778	30.4	1.5	1.0–2.3	.043
Tricyclic antidepressant	22	20.0	352	13.8	1.6	1.0–2.5	.065
Other antidepressant	21	19.1	332	13.0	1.6	1.0–2.6	.088
Anticonvulsive or lithium	8	7.3	196	7.7	1.0	0.5–2.0	1.000
Any other drug	72	65.5	877	34.3	3.6	2.4–5.4	.001*
Paracetamol	6	5.5	154	6.0	0.9	0.4–2.1	.968
Other drug	72	65.5	788	30.8	4.3	2.9–6.4	.001*
Substances ingested (in DSP)							
Benzodiazepines	68	61.8	892	34.9	3.0	2.0–4.5	.001*
Mood drugs	30	27.3	763	29.8	0.9	0.6–1.4	.638
Tricyclic antidepressant	19	17.3	396	15.5	1.1	0.7–1.9	.710
Other antidepressant	6	5.5	218	8.5	0.6	0.3–1.4	.336
Anticonvulsive or lithium	9	8.2	201	7.9	1.0	0.5–2.1	1.000
Paracetamol	11	10.0	731	28.6	0.3	0.2–0.5	.001*
Alcohol	15	13.6	666	26.0	0.5	0.3–0.8	.003
Other drug	30	27.3	1,083	42.4	0.5	0.3–0.8	.002
Nontherapeutic substance	11	10.0	119	4.7	2.3	1.2–4.4	.020
DSM disorder							
Major depression	44	40.0	437	17.1	3.2	2.2–4.8	.001*
Alcohol dependence or abuse	13	11.8	479	18.7	0.6	0.3–1.1	.088
Medical morbidity							
Coma[b]	20	19.1	206	8.2	2.6	1.6–4.4	.001*
Admitted to intensive care unit	32	29.1	439	17.2	2.0	1.3–3.0	.002
Arrhythmia	6	5.5	23	0.9	6.4	2.5–15.9	.001*
Seizure[c]	1	0.9	49	1.9	0.5	0.1–3.5	.695
Length of stay greater than 1 day	63	57.3	502	19.6	5.5	3.7–8.1	.001*
Discharged to psychiatric hospital[d]	40	36.4	618	24.2	1.8	1.2–2.7	.005
Died[e]	6	5.5	14	0.6	10.5	4.0–27.8	.001*

Note. DSM = *Diagnostic and Statistical Manual of Mental Disorders;* DSP = deliberate self-poisoning.
Missing data for elderly/younger of n = [a]0/3; [b]5/57; [c]2/24; [d,e]0/1, respectively.
*Significant at $p < .0015$ (Bonferroni-adjusted level of significance).

Multivariate Analysis (Table 2)

Seven variables were retained in the final model. The elderly age group was significantly more likely to stay in the hospital more than 1 day, to have been prescribed benzodiazepines or "other" drugs prior to DSP, and to have major depression. They were also significantly less likely to have ingested paracetamol or to have ingested "other" drugs in the self-poisoning episode than the younger age group.

DISCUSSION

This study confirms that elderly DSP patients do differ from younger DSP patients in a number of important respects. However, the strength of the association between DSP in the elderly and having been prescribed a benzodiazepine prior to DSP was unexpected. Although the elderly are more often prescribed benzodiazepines (Lockwood & Berbatis, 1990), the rate among these elderly DSP patients (over 60%) is well above community prevalence rates of 5%-30% (Atkinson, 1997; Kirby et al., 1999; Tamblyn et al., 1994). A previous study of prescription rates in the geographic area covered by this study (Buckley et al., 1996) found rates for any psychotropic medication in the over 65s to be less than 25%.

The importance of benzodiazepines in elderly suicide has recently been demonstrated in a controlled study, which found the rate of benzodiazepine prescription was 45% in those who completed suicide. This compared with a rate of 12% in an age-matched sample of primary care attendees (Conwell et al., 2000).

This relationship deserves further attention. One possible reason for the higher rates of benzodiazepine prescription observed in this study is the intentional seeking out of benzodiazepines for ingestion in DSP. Another possibility is depression or disinhibition caused by benzodiazepines, increasing the risk of DSP. Anxiety symptoms themselves may be a precipitating factor in DSP. Alternatively, doctors may be prescribing benzodiazepines in the elderly for symptoms of depression such as insomnia, agitation, somatic preoccupation, and tension (Wilson et al., 1999). Physicians prescribing benzodiazepines to an elderly person should ask themselves whether they have assessed the risk of self-harm and whether depression is a possible diagnosis.

TABLE 2. Factors Associated With Age Group in the Final Logistic Regression Model

Variable	Chi-Square	*df*	*p*	Odds Ratio	95% Confidence Interval
Length of stay greater than 1 day	71.518	1	.0001	5.90	3.87–9.00
Prescribed benzodiazepines	68.233	2	.0000	3.15	2.03–4.89
Prescribed other drug	30.988	3	.0000	5.32	3.34–8.48
Major depression	13.974	4	.0074	2.17	1.41–3.36
Ingested paracetamol	14.238	5	.0142	0.28	0.14–0.54
Ingested other	20.003	6	.0028	0.33	0.20–0.54
Gender	0.578	7	.9991	0.85	0.55–1.30

Our estimated prevalence rates (20-26/100,000) for elderly DSP and the percentage of all DSP (4.1%) are within the range previously reported (Draper, 1996; Hawton & Fagg, 1990; Pierce, 1987; Sendbuehler & Goldstein, 1977). Also consistent with previous research is the finding that the ratio of female to male DSP was lower among the elderly than among the younger group (Hawton & Fagg, 1990; Hepple and Quinton, 1997; Pierce, 1987). The rates of DSP in elderly men and women were similar when the larger numbers of women over 65 in the community are taken into account.

The diagnosis of major depression was made significantly more often in the older group of DSP patients than in their younger counterparts. Forty percent of patients over 65 received this diagnosis compared with 17% in the under 65s. This is lower than previous reports of 53%-96% (Draper, 1996). This may be the result of psychiatric diagnoses being made without a standardized interview schedule. However, the same procedures were used for both age groups, so a comparison between the rates seen in the younger and the older subjects remains valid.

There are large variations between cultures in the pattern of agents ingested during DSP (Chiu et al., 1996). We found patterns of DSP with antidepressants similar to that in the UK (Hawton & Fagg, 1990), but a larger role for benzodiazepines than for paracetamol among the elderly. There was no statistically significant difference between the young and the old in terms of antidepressants being prescribed or ingested during the DSP. Despite the tricyclic antidepressants and the newer antidepressants having similar rates of prescription, there is a suggestion that the newer antidepressants may be used in DSP less commonly than the tricyclics. This could be a focus for further research and has been commented on by other authors (Hawton et al., 1997).

The rate at which the elderly sample was offered inpatient psychiatric care (36%) was lower than in other studies (Draper, 1994; Frierson, 1991; Hawton & Fagg, 1990; Hepple & Quinton, 1997). Around 14% of the sample had ingested alcohol as part of their DSP, within the range of that in other studies (Draper, 1996; Hawton & Fagg, 1990). It is surprising that alcohol abuse and dependence were not significantly less common in the older sample than in the younger group, because there is a rapid decline in alcohol-related diagnosis after the age of 65 (Myers et al., 1984). Thus the importance of alcohol as a contributing factor to elderly DSP should not be underestimated.

Elderly patients were more severely affected by their DSP in terms of mortality, intensive care unit admission, and length of stay. This may be an indirect measure of severity of intent, or could be explained by the lower physical resilience of older persons. The multivariate analysis underscores the medical seriousness of DSP in the elderly, showing length of stay greater than 1 day to be a powerful differentiating factor between those under and over 65 years of age. In-hospital mortality rates were equivalent to those of Hepple and Quinton (1997). The significantly higher mortality rate (5%) for the older DSP patients underscores the fact that DSP, although less common in the elderly, is a highly significant clinical event. The increased importance of potentially reversible factors such as depression and possibly benzodiazepine prescription requires close clinical attention and further research.

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