British Journal of Psychiatry (1993), **163**, 82–90

Depression in Old Age
A Reconsideration of Cerebral Disease in Relation to Outcome

R. C. BALDWIN, S. M. BENBOW, A. MARRIOTT and B. TOMENSON

In a prospective study, 32 patients with depressed mood and cerebral pathology were compared over one year with 66 depressed patients who were cerebrally intact. The hypothesis that the former would have a poorer outcome for depression was not confirmed, although the group with cerebral pathology had a significantly higher than expected death rate. Prognostic factors were identified only for the cerebrally intact group. Those who had major depression were more likely than those with minor depression to be given physical treatments, irrespective of which group they belonged to.

Despite renewed interest in the organic aspects of late-life depression (Jacoby *et al*, 1981; Abas *et al*, 1990; Zubenko *et al*, 1990; Rabins *et al*, 1991) no recent studies have examined the clinical characteristics and outcomes of depression in the elderly with and without brain pathology. There are probably two main reasons for this.

Firstly, the influential DSM–III system of classification (most recently DSM–III–R; American Psychiatric Association, 1987) does not permit a diagnosis of 'major depressive episode' (MDE) unless "it cannot be established that an organic factor initiated and maintained the disturbance." In practice this may be difficult, and for research purposes a conservative approach is usually adopted, resulting in the exclusion of depressed patients who have significant cerebral pathology. Hence, modern studies of depressive illness which have used DSM–III, or one of its forerunners, such as the research criteria of Feighner *et al* (1972), have either wholly excluded patients with dementia or other cerebral pathology (Gordon, 1981; Cole, 1983; Murphy, 1983; Baldwin & Jolley, 1986; Agbayewa, 1990; Kivela *et al*, 1991; Burvill *et al*, 1991) or have mainly excluded them (Sadavoy, 1983; Godber *et al*, 1987).

Secondly, some pioneering studies of late-life psychiatric disorder showed that dementia and depression were associated with different outcomes, which challenged the prevailing view that depression in later life was associated with 'senile brain deterioration' (Kay *et al*, 1955; Roth, 1955; Kay, 1962; Post, 1962). With this dogma dispelled, it was important to study depression separately from disorders such as senile dementia; hence later research into the prognosis of late-life depression excluded patients with known cerebral pathology (Post, 1972).

In old age psychiatric practice, cerebral pathology and mood disorder often coexist. DSM–III–R may classify such patients as having Alzheimer's disease with depression (290.21), multi-infarct dementia with depression (290.43), or 'organic mood syndrome with depression' (293.83). Rather than use current systems such as DSM–III–R, it seems more appropriate to assume little and instead return to the broad descriptive approach of authors such as Post (1962), who merely subdivided his depressed patients into those with and without cerebral disorder, mainly but not exclusively dementia.

Such an approach allows a re-examination of Post's earlier conclusion (1962) – that the presence of cerebral pathology was "of bad prognostic omen" – in the light of modern treatments. Alexopoulos *et al* (1989), in a review of prognostic factors in depression, could find no recent studies specifically concerned with whether dementia influences the outcome of depression, so that the case that cerebral pathology worsens the prognosis of depression is far from proven.

The aim of this study was to compare the outcomes of two depressed groups of patients, one with suspected cerebral pathology and the other without.

Method

The study was a one-year prospective investigation of patients referred to the Department of Old Age Psychiatry (Central Manchester Health Authority), both from the community and from hospital departments. The general entry criteria were: (a) age over 65; (b) first referral to the department. The only exclusion was the presence of such cognitive impairment as to render the individual unable to cooperate with the study measures. In fact no patient was excluded on this ground, but three patients refused to participate.

Depression was judged by a consultant old age psychiatrist, according to criterion A (1 or 2) of DSM–III–R for

MDE: that is, significantly depressed mood on most days for most of the time over the previous two weeks or marked anhedonia lasting over two weeks. Narrow entry criteria were avoided and so the DSM-III-R organic exclusion clause (B (1)) was dropped. Organic factors of possible aetiological significance were divided into systemic and cerebral (see below).

Dementia was initially diagnosed using the syndrome check-list of DSM-III-R. If demented within this definition, a further subdivision was made into 'primary degenerative dementia of the Alzheimer's type, senile onset with depression' and 'multi-infarct dementia, with depression', again using DSM-III-R criteria.

The experimental group, comprising consecutively referred patients, were divided into two groups: those with depression and dementia or other cerebral disorder (DCP – 'depressed/cerebral pathology'), and those depressed but free from any evidence of cerebral disorder (F – 'functional'). The DSM-III-R category 'organic mood syndrome with depression' was avoided as its aetiology permits both cerebral (e.g. brain tumour) and systemic (e.g. hypothyroidism) causes. Hence patients with depression and *systemic* disease were entered into group F and patients with depression and *any* kind of cerebral pathology into group DCP.

There was no standard battery of physical investigations, but due regard was given to the identification of secondary causes of either depression or dementia, including investigation where appropriate in a joint geriatric/psychogeriatric clinic conducted by a consultant from each of those specialties.

Measures at entry

At first contact the following were undertaken: a depression check-list (completed by a consultant in old age psychiatry (RCB or SMB)) which included all DSM-III-R criteria for MDE; the 17-item Hamilton Rating Scale for Depression (HRSD; Hamilton, 1960); a modified form of the Blessed & Roth scale for dementia (B&R) (Blessed *et al*, 1968); verbal fluency (number of words in one minute beginning with 'F', 'A' and 'S'); and the Crichton Behaviour Rating Scale for Dementia (CRBRS; Robinson, 1965).

Within a week of first contact an interviewer visited the patient, collected demographic information, and administered the 30-item Geriatric Depression Scale (GDS; Yesavage *et al*, 1983). In addition, the interviewer administered a simplified version of a standardised check-list to ascertain life events over the preceding year and a purpose-designed rating scale of *perceived* physical health (available from the authors).

Further data included psychotropic medication at referral, psychiatric history, age at first onset of depression, family history, and duration of symptoms. Finally, a parallel form of the health rating scale for *actual* physical health was completed by a doctor not involved in the study.

The study was not a trial of treatment for depression, but a standardised treatment protocol was used, as treatment may influence outcome (Baldwin, 1991). First-line drugs were: dothiepin, amitriptyline or imipramine, up to tolerance or a maximum of 150 mg. If these drugs were contraindicated, mianserin was given up to tolerance or a maximum of 90 mg. For non-responders, defined according to clinical judgement, a course of bilateral electroconvulsive therapy (ECT) (minimum six, if tolerated) or lithium augmentation was given. For urgent cases, ECT could be administered as the first treatment. Finally, where a general practitioner (GP) or other referrer had initiated an appropriate antidepressant which was not one of the above drugs, the patient continued on it.

Assessment of outcome

At 12 weeks, the GDS, B&R and CRBRS were re-administered. At one year an interviewer recorded demographic changes and readministered the GDS, B&R and CRBRS.

Outcome was assessed in two ways, after the suggestion of Post (1962): firstly, a *cross-sectional* outcome was assessed using the GDS with a cut-off score of 11 or more for 'caseness' (Yesavage *et al*, 1983); secondly, *longitudinal* outcome, based on the course of symptoms, was assessed by using a purpose-designed semistructured interview (available from the authors). Information from relatives was taken into account.

Eleven categories of outcome were generated in this way, from which three final categories of outcome were computed at consensus meetings: *recovery* (with or without intervening periods of worsening); *substantial improvement* (with or without periods of worsening); *no change/worse*.

Cause of death, where relevant, was ascertained from case notes, GPs, or death certificates.

Statistical analysis

The two groups (DCP and F) were compared at entry using the Mann-Whitney *U* test for continuous variables and the χ^2 test or Fisher exact test for categorical variables. The same tests were used to show associations between outcome measures and measures at entry to the study, with the addition of the Kruskal-Wallis one-way analysis of variance for continuous measures and longitudinal outcome groups. All analyses were carried out using the Statistical Package for Social Sciences.

Results

There were 66 patients in group F and 32 in group DCP. The study group comprised approximately one-quarter of all new referrals to the department during the study year.

Demographic and social data are presented in Table 1. The sex ratio of the sample was similar to that in other recent studies (Baldwin & Jolley, 1986; Burvill *et al*, 1991); 25% and 35% respectively were living with their spouse or another family member.

The four most common life events reported (in order) for group F were: physical health deterioration (including a hospital admission), illness in a family member, death or other loss of a close friend, and death of a family member. For group DCP the events were: physical health deterioration (including hospital admission), death of

https://doi.org/10.1192/bjp.163.1.82 Published online by Cambridge University Press

Table 1
Comparison of demographic variables and measures of severity in the two groups of patients

	Group F ($n=66$)	Group DCP ($n=32$)	P
Continuous variables: median (interquartile range)			
Age on referral: years	75 (70 to 81)	78 (73 to 84)	0.13
Years of education	9 (9 to 9)	9 (9 to 9)	0.59
Actual physical health score	3 (2 to 5)	4 (2 to 8)	0.17
Perceived health score	6 (4 to 8)	5 (1 to 8)	0.09
GDS score	17 (12 to 23)	16 (10 to 20)	0.29
HRSD score	17 (13 to 22)	13 (8 to 17)	0.0054**
Reduction in GDS at 12 weeks	4 (−1 to 11)	4 (1 to 10)	0.99
No. of previous episodes	0 (0 to 1)	0 (0 to 0)	0.15
Duration of illness: months	4 (2 to 8)	6 (2 to 12)	0.70
No. of confidants	2 (1 to 4)	3 (1 to 5)	0.18
No. of life events before index consultation	4 (2 to 5)	4 (2 to 6)	0.71
No. of life events during study	3 (1 to 4)	1 (0 to 3)	0.0095**
B&R score	25 (9 to 26)	21 (10 to 26)	0.005**
Categorical variables: no. (%)			
No. with MDE	48/66 (73%)	19/32 (59%)	NS
No. of women	48/66 (73%)	25/32 (78%)	NS
Age of onset >65 years	53/66 (80%)	29/31 (94%)	NS
Family history of depression	11/65 (17%)	2/30 (7%)	NS
Married	16/66 (24%)	8/32 (25%)	NS
Living alone	25/66 (38%)	12/32 (38%)	NS
Referred from hospital	19/66 (29%)	6/32 (19%)	NS

**$P<0.01$; comparison was made by Mann–Whitney U test for continuous variables, and χ^2 or Fisher exact tests for categorical variable.

a family member, illness in a family member, and (subjective) financial difficulties.

The median score for adverse life events during the follow-up year differed significantly: three for group F and one for group DCP ($P<0.01$).

Psychiatric status

Of the 32 patients in group DCP, 12 (38%) had a diagnosis compatible with senile dementia of the Alzheimer type (SDAT), in keeping with DSM–III–R, and 15 (47%) with a diagnosis of multi-infarct dementia (MID), again in accordance with DSM–III–R. Of the remaining 15%, one patient was considered to have an alcoholic dementia and four had cerebral pathology (two strokes, one previous leucotomy, and one cerebral tumour), but were not demented. Computerised tomography (CT) was not routinely performed, nor is it a requirement of DSM–III–R, so these diagnoses should be regarded as probable rather than certain. Nevertheless, using these clinical criteria, MID would appear to be over-represented in this depressed group.

The criterion for MDE is five or more of nine symptoms; patients were divided into those who met this criterion and those who did not (Table 1). The latter were difficult to categorise and are referred to as 'minor depressives' (MiDE). Some met the full DSM–III–R criteria for 'dysthymic disorder' and others met the criteria except for the two-year duration. The median number of symptoms for MDE cases was 6 and 5 in groups F and DCP respectively. MiDE patients in the respective groups had medians of 3.5 and 3.0 symptoms. Overall, 50% of group F had depressive symptoms only in the three months, and 36% in the 4–12 months, before referral; 14% had had symptoms for more than one year. The corresponding figures for group DCP were 41%, 41% and 18% respectively (NS).

The median initial GDS values were 17 and 16 for the F and DCP groups, respectively (NS). There were significant differences in initial HRSD and B&R scores between groups (Table 1). The latter difference is to be expected given the composition of the groups.

Physical health

Of groups F and DCP respectively, 70% and 72% had at least one *actual* moderate or severe health problem. The corresponding proportions for *perceived* health difficulties was 88% and 71%. The inter-group comparison for perceived health problems is just significant ($P=0.045$). It suggests that group F perceive themselves as more physically unwell than group DCP, although objectively there were no actual health differences.

The most common physical health problems, of moderate or severe severity, affecting group F were: respiratory system, 30%; cardiovascular system, 27%; and musculoskeletal system, 11%. The corresponding proportions for group DCP were: cardiovascular, 47%; central nervous system, 31%; musculoskeletal, 25%; and respiratory system, 16%. A higher rate of central

https://doi.org/10.1192/bjp.163.1.82 Published online by Cambridge University Press

nervous system disorder and cardiovascular disease would be expected in group DCP.

Treatments

At entry to the study, 31% of group F and 28% of group DCP were receiving antidepressants (usually prescribed by the referring doctor). The corresponding figures for minor tranquillisers were 41% and 31% respectively, and for major tranquillisers were 9% for both groups.

During the study year, 74% of group F and 63% of group DCP were given antidepressants. This difference is not significant. However, when the patients were subdivided into MDE and MiDE, significant differences did emerge in prescribing. Thus, 54 of 67 MDE patients were given an antidepressant compared with 15 of 31 MiDE patients ($\chi^2 = 9.06$, d.f. = 1, $P < 0.001$).

The case notes of the 13 MDE patients who did not receive antidepressants were examined retrospectively: four recovered spontaneously; in two cases recommendations were made to referring doctors but not acted upon; in two instances neuroleptics were prescribed; one patient had moved away; one was deemed to have depression induced by alcohol; one improved after treatment of physical disorder; one was transferred to physicians but died shortly afterwards; and one refused treatment.

For those treated, the prescribed drugs were: dothiepin ($n = 36$), amitriptyline ($n = 15$), mianserin ($n = 8$), imipramine ($n = 3$), and other ($n = 7$). ECT was given to six patients, all from group F, and lithium was prescribed to two patients, one from each group.

Outcome

Cross-sectional outcome, based on a score of 11 or more for 'caseness' at one year on the GDS, was not significantly different in the two groups (Table 2).

Table 2
Outcome at one year

	Group F	Group DCP
Cross-sectional[1]: GDS criterion[2]		
non-case	33 (54%)	12 (40%)
case	20 (33%)	10 (33%)
died	8 (13%)	8 (27%)
Longitudinal[3]: questionnaire		
full recovery	26 (43%)	9 (39%)
substantial improvement	15 (25%)	2 (9%)
no change/worse	11 (19%)	4 (17%)
dead	8 (13%)	8 (35%)

1. Seven missing cases.
2. 'Caseness' rated according to a GDS cut-off score of $\geqslant 11$.
3. Fifteen missing cases.

Cross-sectional difference between groups: $\chi^2 = 2.91$, d.f. = 2, $P = 0.23$; if deaths are treated as missing data, $\chi^2 = 0.13$, d.f. = 1, $P = 0.72$. Longitudinal difference between groups: $\chi^2 = 6.2$, d.f. = 3, $P = 0.10$.

Seven patients refused to do the GDS either initially or at one year, and 16 had died. However, there were no differences in other entry measures between those who did and those who did not complete a one-year GDS. A comparison of initial GDS scores of those with and without one-year GDS evaluations showed no significant differences (Mann–Whitney $U = 774$, $P = 0.93$).

Longitudinal outcome, based on the illness course questionnaire, is also presented in Table 2. The course of illness over one year was similar in the two groups, although the death rate was higher in group DCP. If deaths are treated as missing data there are still no significant differences between groups.

Mortality

There were eight deaths in each group. For the whole sample the death rate was 16.3% with 95% confidence limits of 9.0% and 23.6%. Public health figures for central Manchester indicate, for this age and sex distribution, an expected rate of 6% per annum, so that the overall mortality rate is higher than expected. However, when the data are divided by group, only those in group DCP had a significantly higher than expected rate (25.0% with confidence limits of 10.0% to 40.0%; for group F, the death rate was 12.1% with 95% confidence limits of 4.2% to 20.0%). For the 48 patients in group F with MDE, the subsample which is most comparable to other recent studies, there were seven deaths (three men and four women). This gives a death rate of 14.6%, with 95% confidence limits of 4.6% to 24.6%: although high, the obtained value is not significantly higher than the expected one at the 5% probability level.

The causes of death for group F were: cardiovascular (3), chronic respiratory (1), pulmonary embolus (1), septicaemia (1), and carcinoma (1). A further death was recorded as bronchopneumonia although the subsidiary cause on the certificate was depression. For group DCP the causes were: cerebrovascular accident (3), bronchopneumonia (unqualified) 2, cardiovascular (1), pulmonary embolus (1), and carcinoma (1).

Prognostic factors

Statistical analyses were conducted firstly for the whole sample and then separately for groups F and DCP, on all the measures at entry to the study listed in Table 1.

Whole sample

For the whole sample, a low initial total GDS score and few adverse life events in the follow-up year were associated with a better one-year cross-sectional outcome ($\chi^2 = 5.39$, d.f. = 1, $P < 0.05$; $\chi^2 = 3.8$, d.f. = 1, $P = 0.05$, respectively).

A better longitudinal outcome was significantly associated with a lower initial total GDS score ($\chi^2 = 14.40$, d.f. = 2, $P < 0.001$), fewer adverse life events in the follow-up year ($\chi^2 = 10.19$, d.f. = 2, $P < 0.01$), and not *being alone* at home at the time of referral ($\chi^2 = 7.03$, d.f. = 2, $P < 0.05$).

All the quoted statistics treat deaths as missing data, but the same associations hold true if deaths are included

https://doi.org/10.1192/bjp.163.1.82 Published online by Cambridge University Press

as an additional outcome category, although poor initial actual health is then also found to be associated with outcome ($\chi^2 = 14.36$, d.f. = 3, $P < 0.01$).

Being alone at home at referral is a subset of the category 'living alone', as some of the patients who were in hospital at the time of referral normally lived on their own. If the latter are reclassified according to their normal residence, no association is apparent between outcome and living alone. Rather the results suggest that those who were alone *at referral* were less likely to have had a full recovery over the year than those who were with family, in residential care, or in hospital at the time of referral.

Comparison of groups

With respect to *cross-sectional* outcome, the same associations (initial GDS total score and life events in the follow-up year) with outcome were apparent within group F as for the whole sample (GDS total: $\chi^2 = 7.10$, d.f. = 2, $P < 0.01$; life events: $\chi^2 = 4.40$, d.f. = 1, $P < 0.05$). There were no significant associations for group DCP alone, and no evidence that there would have been if the group had been larger.

For the *longitudinal* course, once again in group F initial GDS score ($\chi^2 = 13.11$, d.f. = 2, $P < 0.01$) and life events in the follow-up year ($\chi^2 = 7.33$, d.f. = 2, $P < 0.05$) were associated with outcome. Being alone just fell short of significance ($\chi^2 = 5.22$, d.f. = 2, $P = 0.07$). The direction of associations was the same as for the whole sample. Again, no associations could be detected when the analysis was repeated on group DCP alone.

In summary, associations between measures at entry and the two outcome measures were evident only for group F.

Relationship between cognitive function and GDS score

To study the possibility that improvement in mood may be associated with improvement in cognitive function, the reduction in GDS score over one year was examined in relation to changes in two measures of cognitive function (B&R score and verbal fluency) and with one measure of dependency (CRBRS). This analysis was carried out separately for each of two groups, one (depressed plus dementia) comprising group DCP patients *except* the four who had focal cerebral disorder but who were not demented, and the other (depressed without dementia) comprising all group F patients *and* the four patients with focal cerebral disorder. The Wilcoxon matched-pairs signed-rank test was used to assess the significance of change in scores from admission to the one-year follow-up, and Spearman correlations were used to find any significant associations between changes in scores in the four variables.

For the 28 demented patients, the reduction in median GDS score over the year was of borderline significance ($Z = -1.9$, $P = 0.053$); there was a significant reduction (representing worsening) in median B&R scores ($Z = -3.31$, $P < 0.001$) and a significant increase (again representing worsening) in median CRBRS scores ($Z = -2.59$, $P < 0.01$); there was no significant change in verbal fluency. The reduction in GDS score was significantly correlated with a reduction in the B&R score ($r(s) = -0.57$, $n = 19$, $P < 0.05$) but not with the other changes in scores. There was an average of seven missing cases per variable in the analysis.

The scatterplot of reduction in GDS against reduction in B&R suggests that patients who had a large reduction in B&R (worsening cognitive function) were less likely to show a reduction in their depression score than those who had only minor reduction or an improvement in B&R (who were more likely to show a large reduction in depression score).

For the 70 non-demented patients, the median GDS scores reduced significantly over the year ($Z = -5.75$, $P < 0.001$) and the median scores for verbal fluency significantly increased ($Z = -2.39$, $P < 0.05$). There were no significant changes in either B&R or CRBRS (median) scores. However, the Spearman correlation coefficient between reduction in GDS and increase in verbal fluency was not significant ($r(s) = 0.21$, $n = 31$, $P = 0.27$), and none of the changes in these four scores was significantly correlated with any of the others. There was an average of 14 missing items per variable.

Discussion

Although the patients in this study with depression and cerebral disorder, mainly dementia, tended to have poorer outcomes than those who were intact, the group differences are not statistically different, whether or not deaths are included in the comparison. This conflicts with traditional teaching. The strengths and limitations of the study are therefore discussed first.

A narrow approach to the definition of depression was purposely avoided. This permitted a *post hoc* classification along DSM-III-R lines, but with the omission of the organic exclusion criterion. The simplicity of subdividing depressed patients into those with and without evidence of cerebral pathology is two fold. It allows comparison with Post (1962) and avoids the ambiguity contained in terms such as 'organic mood syndrome', as in DSM-III-R. Because there was no standard 'test battery' and because neuroimaging of all patients was not feasible, it is possible that some misclassification occurred, for example the inclusion of patients in group F with occult cerebral disorder, or of an overlooked systemic cause of dementia in group DCP. This seems unlikely, as all assessments were made by a consultant psychogeriatrician with access to a comprehensive range of investigative facilities, including a jointly run geriatric/psychogeriatric assessment clinic. Furthermore, neither the status of patients at follow-up nor information from death certification suggested any examples of misclassification.

Those not meeting the full criteria for MDE were classified as having 'minor depression'. Although there is no such official category in current classificatory

systems, its existence is increasingly recognised as important but under-investigated (Blazer, 1991). Indeed, over half the patients in this study so classified required antidepressant drug treatment. The symptoms are similar to those of DSM-III-R 'dysthymic disorder', but this contains an arbitrary time restriction which has been criticised elsewhere (Copeland *et al*, 1990).

Our measure of longitudinal outcome may be criticised for being different from that used by others, but there is no consensus on how to measure longitudinal outcome (Burvill *et al*, 1991). Our assessment avoided simple dichotomies such as 'good' and 'poor' which do not do justice to the clinical reality of worthwhile, if incomplete, recoveries.

Finally, a study with relatively small numbers is susceptible to a type II statistical error, so that a strict interpretation of our findings is that the null hypothesis, of no difference between the groups, cannot be rejected.

Characteristics of the sample

The patients studied were approximately a quarter of total referrals to the service over the year. Those rated as depressed with cerebral pathology comprised 27% of all organic psychosyndrome cases referred to the department during the study year, making it an important comorbid condition presenting for treatment. There was an over-representation of patients with vascular dementias. Thus, 37% of patients with MID and 22% with SDAT had significant depression. Although DSM-III-R criteria for these disorders are broad, admitting the possibility of some misclassification, these figures support other work suggesting that patients with MID have higher rates of depressed mood than those with SDAT (Cummings *et al*, 1987). A prevalence of 22% for depression in SDAT is similar to that reported by Burns *et al* (1990), who also studied an elderly population.

Although the DCP group were less likely to be rated as major depressives than the comparison group, this difference was not marked and not statistically significant. Using figures from our department in conjunction with data from this study, and assuming that our service is typical, then about one in six of all referrals with an organic psychosyndrome can be expected to have a significant and potentially treatable depression.

Mortality

There are difficulties in trying to decide how to attribute death as an outcome (Burvill *et al*, 1991). Clearly, in an elderly population death cannot be regarded automatically as a bad outcome. Suicide is clearly a bad outcome, but there were no suicides in this sample. Judged by death certification, one patient's death (from broncho-pneumonia) was possibly secondary to depression. Unfortunately, the course of symptoms is not known for those patients who died before the one-year assessment.

Recent studies (Murphy, 1983; Rabins *et al*, 1985) have recorded high death rates for cerebrally intact depressives, but our findings show the importance of placing such findings in the context of locally derived death rates. The figure of 14.6% for those in the 'functional' group suffering MDE is within the confidence limits for the base population. The death rate among those with cerebral disorder was higher than the local rate, but this would be expected. Whether depression added to the mortality rate expected for dementia is not answerable from our data. The causes of death were heterogeneous, and numbers too small to suggest an association between depression and death from any particular system pathology.

Comparisons with other studies

Post's study (1962) covered a much longer period, and his patients were more severely depressed, but his work generated the hypothesis for this study. Of Post's 81 patients who, on admission, had been free from cerebral disorder, 48 (59%) made good recoveries compared with only five (26%) of the 19 with depression and cerebral pathology. In this study, the inability to assess the outcome of depression of those who died complicates comparison. Nevertheless, of those patients available to follow-up at one year, approximately two-thirds of patients free from cerebral organic disorder and about half of those with coexistent cerebral pathology were non-cases. A similar proportion were either fully recovered or significantly improved on the longitudinal measure of illness course, with deaths included.

In our DCP group, 63% of patients were prescribed an antidepressant drug. The only physical treatment available to Post's patients was ECT. Other studies which antedate ECT (Hoch & MacCurdy, 1922) or from the era when ECT was the only physical treatment (Ciompi, 1969) also indicated that cerebral deterioration, not otherwise defined, presaged a poor outcome. A possible inference from the results of this study is that the advent of pharmacological therapies has improved the outcome for depressed patients with cerebral pathology, at least for patients with mild to moderate depression.

Four recent papers have examined the one-year prognosis of depression, but since all of them excluded depressives with cerebral impairment, only those patients in this study without evidence of cerebral disorder (group F) can properly be compared. The one-year cross-sectional outcome, as judged by depression 'caseness', in this study is similar to that of Baldwin & Jolley (1986): 54% of patients were well at one year in this study compared with 58% of patients studied by Baldwin & Jolley. This is better than the 35% of Murphy's (1983) cohort but close to that of Burvill *et al* (1991) (47%).

A stricter comparison involves our 48 cases who had *major* depression without organic cerebral factors, using the data on the course of illness rather than cross-sectional status. On this basis, 49% had experienced full recovery, 24% had improved over the year, 11% were unchanged or worse, and 16% had died. These findings are similar to those of Baldwin & Jolley (1986) and Burvill *et al* (1991), and more favourable than the cohort investigated by Murphy (1983).

However, it is clear that the patients in this study were less severely depressed than those in the above studies, with much lower overall scores on the HRSD and few psychotic patients. More comparable is the study of Kivela *et al* (1989, 1991): the mean score of their patients on the HRSD was 22 for their major depressed group compared with our 19, using the 22-item and 17-item Hamilton scales respectively. They found 63% of major depressives were well at one year compared with 48% of those with dysthymic disorder. The comparable figures for cross-sectional outcome in this study are 59% of major depressives were non-cases at one year compared with 26% of the minor depressives ($\chi^2 = 6.63$; d.f. = 1, $P < 0.05$), with deaths included in the analysis. Using the course of illness, more favourable outcomes for major depression are again evident, but the result just falls short of statistical significance ($\chi^2 = 7.09$, d.f. = 3, $P = 0.07$). These findings support those of Kivela *et al*, that major depression in the elderly may have a better outcome than minor depression.

Prognostic and predictive factors

A higher initial GDS score at referral was the measure most strongly associated with a worse outcome. If the GDS score is regarded as a measure of severity (although it was not designed specifically for that purpose), it is surprising that the HRSD was not similarly associated with outcome. The reasons for this are not clear. The GDS was introduced because scales such as the HRSD are biased toward physical depressive symptoms, which may complicate the diagnosis of depression in older subjects (Snowdon, 1990; Blazer, 1991). One explanation for the finding is that the presence of more cognitive symptoms of depression, notably depressive ideation, which is what the GDS is designed to detect, is associated with a poorer prognosis. This may have implications for the measurement of depression in older patients, particularly those with comorbidity such as dementia, and its relationship to outcome.

The other factors which significantly influenced outcome were adverse life events (including health-related ones) in the follow-up year and whether the patient was on his/her own at first referral (but not necessarily whether normally living alone), both of which were associated with a poor outcome. Patients who were in hospital at referral had better outcomes than those who lived alone, even though many of the former normally lived at home. This apparently contradictory finding may have arisen because depressed patients first admitted to the medical wards had not been coping well and, following medical stabilisation, moved on to a more supportive (usually residential) environment, which may have benefited their depression. Lastly, for those who were cerebrally intact, major as opposed to minor depression was associated with a better outcome.

The prognostic factors identified here have been implicated in some recent studies of depression (Murphy, 1983; Baldwin & Jolley, 1986; Godber *et al*, 1987; Kivela *et al*, 1991), but not others (Agbayewa, 1990; Burvill *et al*, 1991). No other factors were associated with outcome, including initial physical health, which has been strongly linked to outcome in severe depression (Murphy, 1983; Baldwin & Jolley, 1986).

Few prognostic factors were identified and these were only relevant to the cerebrally intact group. This suggests that the depressed patients without cerebral pathology were a more homogeneous group than those with cerebral pathology.

Non-demented depressed patients improved on one measure of cognitive function, namely verbal fluency, which paralleled improvement of the depression. Although 'pseudodementia', or cognitive impairment associated with depression (Pearlson *et al*, 1989), is not germane to the hypothesis of this study, this finding is reminiscent of other work highlighting a reversible slowing of cognition in depression (Rogers *et al*, 1987). That a similar finding could not be convincingly demonstrated for the cerebrally impaired group may be because of small numbers or because the progression of dementia during the year obscured any cognitive

improvement following improvement in depression. There was some evidence to support the latter from inspection of the scatterplot.

Another finding of interest was that the 'treatment imperative' was determined more by whether patients had major as opposed to minor depression, rather than whether cerebral disease was present or not. This raises important questions about the subtyping of depression in the elderly. One dimension is clearly whether cerebral disease is present or not, but another is whether the depression is major or minor. These two dimensions require a separate analysis of all four groups – major, minor, 'functional' and 'depressed/cerebral pathology' – as it seems likely that each may be associated with different prognostic factors. We have carried out such an analysis using logistic regression and will report the findings separately. Clearly, given sufficient numbers, other 'dimensions' might be isolated, including, importantly, prognostic factors associated with particular types of dementia, something which was not possible in this study.

Conclusions

This study has not confirmed traditional teaching that cerebral pathology is associated with a worse outcome for depression in the elderly. Depression is an important cause of comorbidity in such patients and is eminently treatable. Its course and prognostic factors have been relatively neglected, probably because current diagnostic classifications are either too exclusive or too fragmentary. There is a need to re-evaluate the symptoms, treatment requirements, and outcome of depression associated with different types of brain pathology in much larger samples. Lastly, in this study, the division into major and minor depression was more important in practical management than subtyping depression according to the presence or not of cerebral pathology.

References

ABAS, M. A., SAHAKIAN, B. J. & LEVY, R. (1990) Neuropsychological deficits and CT scan changes in elderly depressives. *Psychological Medicine*, **20**, 507–520.

AGBAYEWA, M. O. (1990) Outcome of depression in a geriatric medical day hospital following psychiatric consultation. *International Journal of Geriatric Psychiatry*, **5**, 33–39.

ALEXOPOULOS, G. S., YOUNG, R. C., ABRAMS, R. C., *et al* (1989) Chronicity and relapse in geriatric depression. *Biological Psychiatry*, **26**, 551–564.

AMERICAN PSYCHIATRIC ASSOCIATION (1987) *Diagnostic and Statistical Manual of Mental Disorders* (3rd edn, revised) (DSM-III-R). Washington, DC: APA.

BALDWIN, B. (1991) The outcome of depression in old age. *International Journal of Geriatric Psychiatry*, **6**, 395–400.

BALDWIN, R. C. & JOLLEY, D. J. (1986) The prognosis of depression in old age. *British Journal of Psychiatry*, **149**, 574–583.

BLAZER, D. (1991) Clinical features in depression in old age: a case for minor depression. *Current Opinion in Psychiatry*, **4**, 596–599.

BLESSED, G., TOMLINSON, B. E. & ROTH, M. (1968) The association between quantitative measurements of dementia and of senile changes in the cerebral grey matter of elderly subjects. *British Journal of Psychiatry*, **114**, 797–811.

BURNS, A., JACOBY, R. & LEVY, R. (1990) Psychiatric phenomena in Alzheimer's disease. III: Disorders of mood. *British Journal of Psychiatry*, **157**, 81–86.

BURVILL, P. W., HALL, W. D., STAMPFER, H. G., *et al* (1991) The prognosis of depression in old age. *British Journal of Psychiatry*, **158**, 64–71.

CIOMPI, L. (1969) Follow-up studies on the evolution of former neurotic and depressives states in old age. *Journal of Geriatric Psychiatry*, **3**, 90–106.

COLE, M. G. (1983) Age of onset and course of primary depressive illness in the elderly. *Canadian Journal of Psychiatry*, **28**, 102–104.

COPELAND, J. R. M., DEWEY, M. E. & GIFFITHS-JONES, H. M. (1990) Dementia and depression in elderly persons: AGECAT compared with DSM-III and pervasive illness. *International Journal of Geriatric Psychiatry*, **5**, 47–51.

CUMMINGS, J., MILLER, B., HILL, M. A., *et al* (1987) Neuropsychiatric aspects of multi-infarct dementia and dementia of Alzheimer type. *Archives of Neurology*, **44**, 389–393.

FEIGHNER, J. P., ROBINS, E., GUZE, S. B., *et al* (1972) Diagnostic criteria for use in psychiatric research. *Archives of General Psychiatry*, **26**, 57–63.

GODBER, C., ROSENVINGE, H., WILKINSON, D., *et al* (1987) Depression in old age: prognosis after ECT. *International Journal of Geriatric Psychiatry*, **2**, 19–24.

GORDON, W. F. (1981) Elderly depressives: treatment and follow-up. *Canadian Journal of Psychiatry*, **26**, 110–113.

HAMILTON, M. (1960) A rating scale for depression. *Journal of Neurology, Neurosurgery and Psychiatry*, **23**, 56–62.

HOCH, A. & MACCURDY, J. T. (1922) The prognosis of involutional melancholia. *Archives of Neurology and Psychiatry*, **7**, 1–17.

JACOBY, R. J., LEVY, R. & BIRD, J. M. (1981) Computed tomography and the outcome of affective disorder: a follow-up study of elderly patients. *British Journal of Psychiatry*, **139**, 288–292.

KAY, D. W. K. (1962) Outcome and cause of death in mental disorders of old age: a long term follow-up of functional and organic psychoses. *Acta Psychiatrica Scandinavica*, **38**, 249–276.

———, ROTH, M. & HOPKINS, B. (1955) Affective disorders in the senium: their association with organic cerebral degeneration. *Journal of Mental Science*, **101**, 302–316.

KIVELA, S.-L., PAHKALA, K. & ERONEN, A. (1989) Depressive symptoms and signs that differentiate major and atypical depression from dysthymic disorder in elderly Finns. *International Journal of Geriatric Psychiatry*, **4**, 79–85.

———, ——— & LAIPPALA, P. (1991) A one-year prognosis of dysthymic disorder and major depression in old age. *International Journal of Geriatric Psychiatry*, **6**, 81–87.

MURPHY, E. (1983) The prognosis of depression in old age. *British Journal of Psychiatry*, **142**, 111–119.

PEARLSON, G. D., RABINS, P. V., KIM, W. S., *et al* (1989) Structural CT brain changes and cognitive deficits with and without reversible dementia ('pseudodementia'). *Psychological Medicine*, **19**, 573–584.

POST, F. (1962) *The Significance of Affective Symptoms in Old Age*. Maudsley Monographs No. 10. London: Oxford University Press.

——— (1972) The management and nature of depressive illnesses in late life: a follow-through study. *British Journal of Psychiatry*, **121**, 393–404.

RABINS, P. V., HARVIS, K. & KOVEN, S. (1985) High fatality rates of late-life depression associated with cardiovascular disease. *Journal of Affective Disorders*, **9**, 165–167.

———, PEARLSON, G. D., AYLWARD, E., *et al* (1991) Cortical magnetic resonance imaging changes in elderly inpatients with major depression. *American Journal of Psychiatry*, **148**, 617–620.

ROBINSON, R. A. (1965) The organisation of a diagnostic and treatment unit for the aged in a mental hospital. In *Psychiatric Disorders in the Aged*, pp. 186–205. Manchester: Geigy UK.

ROGERS, D., LEES, A. J., SMITH, E., *et al* (1987) Bradyphrenia in Parkinson's disease and psychomotor retardation in depressive illness. *Brain*, **110**, 761–776.

ROTH, M. (1955) The natural history of mental disorder in old age. *Journal of Mental Science*, **101**, 281–301.

SADAVOY, J. & REIMAN-SHELDON, E. (1983) General hospital geriatric psychiatric treatment: a follow-up study. *Journal of the American Geriatric Society*, **31**, 200–205.

SNOWDON, J. (1990) The prevalence of depression in old age. *International Journal of Geriatric Psychiatry*, **5**, 141–144.

YESAVAGE, J. A., BRINK, T. L., ROSE, T. L., *et al* (1983) Development and validation of a geriatric depression screening scale: a preliminary report. *Journal of Psychiatric Research*, **17**, 37–49.

ZUBENKO, G. S., SULLIVAN, P., NELSON, J. P., *et al* (1990) Brain imaging abnormalities in mental disorders of late life. *Archives of Neurology*, **47**, 1107–1111.

*R. C. Baldwin, BSc, MRCP, MRCPsych, *Consultant in Old Age Psychiatry*; S. M. Benbow, MSc, MRCPsych, *Consultant in Old Age Psychiatry*; A. Marriott, MSc, ASBPS, *Principal Clinical Psychologist, York House, Manchester Royal Infirmary*; B. Tomenson, MSc, *Medical Statistician, University Department of Psychiatry, Rawnsley Building, Manchester Royal Infirmary, Oxford Road, Manchester M13 9BX*

*Correspondence: *York House, Manchester Royal Infirmary, Oxford Road, Manchester M13 9BX*