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Survey of Admissions to Residential and Nursing Home Care. 30 Month Follow-Up

Andrew Bebbington,
Pamela Brown,
Robin Darton,
Kathryn Miles and Ann Netten

PSSRU discussion paper 1537
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The **PERSONAL SOCIAL SERVICES RESEARCH UNIT** undertakes social and health care research, supported mainly by the United Kingdom Department of Health, and focusing particularly on policy research and analysis of equity and efficiency in community care, long-term care and related areas — including services for elderly people, people with mental health problems and children in care. The PSSRU was established at the University of Kent at Canterbury in 1974, and from 1996 it has operated from three sites:

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Survey of Admissions to Residential and Nursing Home Care

30 Month Follow-Up

Andrew Bebbington, Pamela Brown, Robin Darton, Kathryn Miles and Ann Netten

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1.1 Introduction

This report presents results from the third follow-up of individuals included in the 1995 PSSRU Survey of Admissions to Residential and Nursing Homes. This survey included 2544 people over 65 who were admitted from 18 local authorities during the autumn of 1995, as long-stay, local authority supported residents of residential or nursing homes. The follow-ups concern the survival, location, health (dependency) and funding of the original sample. Information is for the most part being provided by home managers, though people leaving homes to live elsewhere have also been followed up.

The first and second follow-ups were at six and 18 months, and the third, to which this report relates, was at 30 months. One further follow-up will be made at 42 months. This is a preliminary report of the 30 month stage: a further report developing more fully some of the issues considered in this report will be prepared.

Chapter 2 outlines the methodology and describes the location at 30 months, length of stay in residential and nursing homes, and changes in the dependency of survivors. Chapter 3 describes people who had been discharged and were known to be living outside homes, from six months after admission onwards. Chapter 4 analyses the pattern of mortality up to 30 months, and develops a model which enables survival to be predicted from circumstances at admission.

1.2 Findings

Chapter 2 reports that:

- 27 per cent of the cases for whom information on location was known at 30 months were still in the same type of bed as on admission (19 per cent of those originally admitted to a nursing bed and 33 per cent of those originally admitted to a residential bed).
- 67 per cent of the cases for whom information on location was known at 30 months had died. This included 77 per cent of those originally admitted to a nursing bed and 59 per cent of those originally admitted to a residential bed.
- Of those who left within 30 months, 95 per cent of those admitted to nursing beds and 84 per cent of those admitted to residential beds had died. The average length of stay had been 234 days and 333 days respectively.

- Levels of dependency on admission among those who were in a nursing bed at the 30 month follow-up were substantially greater than the corresponding levels of dependency among those who were in a residential bed.
- Individuals who returned to a private household were more likely to have been living with others prior to admission, but those who survived to 30 months were no more likely to have been living with others prior to admission. (Chapter 3 also reports that those who returned to a private household were likely to have originally had accommodation problems.) Those who survived to 30 months had below average levels of dependency on admission, particularly with regard to confusion.
- At 30 months, levels of dependency among those remaining in residential or nursing home care tended to be greater than on admission. Physical dependency had increased more among those admitted to a residential bed than among those admitted to a nursing bed, but confusion had increased more among those admitted to a nursing bed.

Chapter 3 reports that:

- The level of discharges in the 30 months following admission to residential and nursing home care was low, 8 per cent of all admissions, half of whom were to the community.
- Two thirds of all moves out of care occurred within 6 months of admission, the discharge rate becoming negligible by 30 months.
- Discharges to the community occurred more frequently in the counties and much less frequently in the London boroughs, where there were proportionately more discharges to hospital.
- Survival of those returning to the community is better than those remaining in residential care.
- Social services departments provided support on discharge to one third of people who returned to the community; for these, the level of input was moderately high.

Chapter 4 reports that:

- The median survival for the whole sample is 18.3 months (± 0.8 months). For those originally admitted to nursing homes it is 10.5 months (± 0.9 months), and for residential care is 25.3 months (± 0.9 months).
- Mortality rates are high initially, especially in nursing homes, but after about 6 months settle to around 2½ % per month (for the combined sample), rising slowly to about 3½ % by 30 months.
- The factors at admission that significantly raise subsequent mortality are, in order of their significance: having a malignancy (cancer), having a low Barthel score (high disability), old age, being a man, being admitted to a nursing home, being admitted from a hospital,

having a respiratory illness.

- There are no significant differences between local authorities in survival outcomes, after taking into account other factors.
- As a few residents will live for a long while, the average length of survival is much greater than the median. At this stage it seems likely to be about 27-29 months.

Chapter 4 also develops a model for predicting likely survival from the circumstances at the time of admission.

1.3 Acknowledgements

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Chapter 2
Results of the 30 Month Follow-Up

2.1 Introduction

This chapter presents results from the third follow-up of individuals included in the 1995 PSSRU Survey of Admissions to Residential and Nursing Homes. The residential and nursing homes to which elderly people were admitted during a three-month period in autumn 1995 were contacted six months, 18 months and then 30 months later. At each stage, home managers were asked to complete a questionnaire to record the location of the elderly person and, if they were still resident in the home, information on their level of dependency. The information on dependency was designed to correspond to the information recorded in the admissions survey. For those elderly people who were no longer in the home, respondents were asked to record their destination and the date of departure or death. If an elderly person had moved to another residential or nursing home, the new home was contacted and asked to complete the same questionnaire. Separate exercises were conducted in parallel to the six month, 18 month and 30 month follow-ups, to follow up those elderly people who left the home to return to a private household or who were discharged to hospital without their bed in the home being kept open. Information about these cases was obtained from the local authority which made the original assessment for admission, and included information on dependency for individuals who were still alive and who had not returned to residential or nursing home care. Those re-admitted to a residential or nursing home were then included in the main series of follow-up studies. The results from the six month and 18 month follow-ups, including information about those elderly people who returned to a private household or who were discharged to hospital, have been presented in two previous papers (Darton and Brown, 1997; Bebbington et al., 1998). This chapter presents results from the 30 month follow-up, based on information obtained from home managers. The results of the separate exercise conducted in parallel to the 30 month follow-up, which followed up those who had left the home, are described in chapter 3.

The full database for the admissions survey included 2629 individuals. However, the survey included two groups of individuals who were included at the request of two of the participating local authorities: 66 individuals in the first local authority were on a waiting list for admission; and three individuals in the second local authority were receiving alternative packages of care to residential or nursing home care. In addition, 15 individuals were aged under 65 years, including one of the waiting list cases, and two were found to be short-term admissions.

The information presented in the papers on the results of the six month and 18 month follow-ups was based on 2544 individuals included in the admissions survey, following the exclusion of the 85 out-of-scope cases described above, and this chapter is based on the same 2544 cases, although one case was subsequently reported to be a duplicate case. As in the previous papers, the cases have not been weighted for the purposes of the analyses presented in this chapter.

The original survey in autumn 1995 included a check on the location of the elderly people one month after admission. One hundred and seventy two individuals were reported to have died and 65 individuals were reported as having moved to another location within one month of admission. In addition, separate information was obtained on the death of 28 individuals, of whom four had moved to another location within one month of admission. At the six month follow-up, information was obtained for 1920 of the 2544 individuals included in the analysis of the admissions survey, including two cases reported to have died within one month of admission, although the information on location at the six month follow-up was incomplete for three cases. No information was obtained at the six month follow-up for 43 of the 61 individuals who were reported as having moved to another location within one month of admission, but who were not reported to have died, and the information obtained on the location of these cases one month after admission was used as the location at six months. Thus the information on location at the six month follow-up shown in the previous report (Bebbington et al., 1998) is based on 2158 cases, 85 per cent of the 2544 individuals included in the analysis of the admissions survey. However, the figures for the six month follow-up presented in the previous report did not incorporate separate information which was obtained on deaths within the first six months. In addition, further information on deaths by six months was obtained at the subsequent follow-ups. The information on location at the six month follow-up includes 196 additional deaths. For 132 of these individuals their location at six months was previously classified as unknown. Thus the information on location presented below is based on 2290 cases. The cases who were not followed up at six months included 44 individuals who refused to be included in the follow-up and eight cases who were untraceable. For 30 of the 743 deaths recorded at the six month follow-up, the date of death occurred more than six months after admission. However, this problem was largely overcome in the questionnaires used for the subsequent follow-ups by improving the instructions on the questionnaires.

The 18 month follow-up included individuals who were alive, traceable and who had not previously refused to take part in the study. 1831 of the 2629 cases in the full database remained after excluding cases who were recorded as having died at the time of the six month follow-up, those who refused and those who were untraceable. Additional information obtained from homes and local authorities between the six month and 18 month follow-ups, together with information from the six month follow-up, identified a further 431 cases who had died, or who

had moved to a private household or who had been discharged to hospital. Excluding these cases, and the three individuals included in the admissions survey who were receiving alternative packages of care, resulted in a total of 1397 individuals for whom an 18 month follow-up questionnaire was sent to home managers. Information was obtained for 1161 of the 1397 individuals covered by the 18 month follow-up (83 per cent), of whom 1128 were included among the 2544 cases used in the analyses presented in this chapter. The cases who were not followed up at 18 months included 32 individuals who refused to be included in the follow-up and eight cases who were untraceable or ineligible, for example those who were self financing. Among the 1128 cases for whom information was obtained at the 18 month follow-up, 120 were recorded as having died, four were recorded as having moved to a private household and 11 were recorded as having been discharged to hospital. The information obtained at the 18 month follow-up has been combined with additional information on deaths, moves to a private household and discharges to hospital, to provide comprehensive information on location at the 18 month follow-up. As for the information presented on the six month follow-up, the information presented in this chapter on location at 18 months incorporates some separate information on deaths within the first six months and further information obtained at the subsequent, 30 month follow-up. The information on location at the 18 month follow-up includes 221 additional deaths within the first 18 months. For 130 of these individuals their location at 18 months was previously classified as unknown. In the previous report, information on the location of individuals who were recorded as having left residential or nursing home care at the six month follow-up or between the six month and 18 month follow-ups was used as the location at 18 months, if no subsequent information on location at 18 months was available. This procedure has not been applied for this chapter, and therefore the increase in the number of cases with information on location at 18 months is smaller than 130. Information on location at 18 months presented below is based on 2233 cases, instead of 2135 cases as in the previous report.

The methodology used for the 18 month follow-up was repeated for the 30 month follow-up. Beginning with the 1831 cases identified for the 18 month follow-up, 1269 remained after excluding cases who were recorded as having died prior to or during 18 month follow-up, those who refused, those who were untraceable or ineligible, the three individuals included in the admissions survey who were receiving alternative packages of care, and a duplicate case. Additional information obtained from homes and local authorities between the 18 month and 30 month follow-ups identified a further 296 cases who had died, or who had moved to a private household or who had been discharged to hospital. Excluding these cases resulted in a total of 973 individuals for whom a 30 month follow-up questionnaire was sent to home managers. Information was obtained for 819 of the 973 individuals covered by the 30 month follow-up (84 per cent), of whom 801 were included among the 2544 cases used in the analyses presented in

this chapter. The cases who were not followed up at 30 months included 11 individuals who refused to be included in the follow-up and two cases who were untraceable. Among the 801 cases for whom information was obtained at the 30 month follow-up, 84 were recorded as having died, four were recorded as having moved to a private household and seven were recorded as having been discharged to hospital. As for the previous follow-ups, the information obtained at the 30 month follow-up has been combined with additional information on deaths, moves to a private household and discharges to hospital, to provide comprehensive information on location at the 30 month follow-up. Information on location at 30 months presented below is based on 2301 cases.

2.2 Location of Elderly People at Six Month, 18 Month and 30 Month Follow-Ups

Tables 2.1 and 2.2 present information on the location of the elderly people at the six month, 18 month and 30 month follow-ups, after incorporating the adjustments to each set of follow-up data described in section 2.1. These adjustments include information on deaths of individuals who had moved to a private household or who had entered hospital. Thus, the proportions of deaths at six months and 18 months are higher than the corresponding figures shown in the previous reports (Darton and Brown, 1997; Bebbington et al., 1998). The type of bed to which the individuals were originally admitted refers to the type of bed recorded in the admissions survey, and does not necessarily correspond to the type of bed to which individuals who were already in residential or nursing home care were first admitted. As noted above, information on the location of individuals at six months was obtained for 2290 of the 2544 individuals included in the admissions survey (90 per cent). Of these 2290 cases, 61 per cent were still in the same type of bed as on admission, 32 per cent had died, 2 per cent had moved to a different type of bed, 3 per cent had moved to a private household and one per cent had entered hospital. At 18 months, information was obtained on the location of 2233 individuals (88 per cent). Of these 2233 cases, 40 per cent were still in the same type of bed as on admission, 54 per cent had died, 4 per cent had moved to a different type of bed, 2 per cent had moved to a private household and nine individuals had entered hospital. At 30 months, information was obtained on the location of 2301 individuals (90 per cent). Of these 2301 cases, 27 per cent were still in the same type of bed as on admission, 67 per cent had died, 4 per cent had moved to a different type of bed, 2 per cent had moved to a private household and 11 individuals had entered hospital.

Individuals admitted to a nursing bed in autumn 1995 were more likely than those admitted to a residential bed to have died by the six month follow-up, and less likely to be in the same home or to have moved elsewhere, either to hospital or to a private household. Among the individuals for whom follow-up information was obtained, 45 per cent of those originally admitted to a

nursing bed had died, compared with 21 per cent of those originally admitted to a residential bed, while 52 per cent of those originally admitted to a nursing bed and 70 per cent of those originally admitted to a residential bed were still in the same type of bed. By the 18 month follow-up, 67 per cent of those originally admitted to a nursing bed had died, compared with 42 per cent of those originally admitted to a residential bed, while 28 per cent of those originally admitted to a nursing bed and 50 per cent of those originally admitted to a residential bed were still in the same type of bed. By the 30 month follow-up, 77 per cent of those originally admitted to a nursing bed had died, compared with 59 per cent of those originally admitted to a residential bed, while 19 per cent of those originally admitted to a nursing bed and 33 per cent of those originally admitted to a residential bed were still in the same type of bed.

Table 2.3 presents information on the destination of the elderly people who left residential or nursing home care within 30 months of admission, by their location at the 30 month follow-up. A total of 106 individuals (4 per cent of all individuals) were recorded as having moved to a private household and a total of 95 individuals (4 per cent) were recorded as having been discharged to hospital during the 30 months following admission. Among those who had moved to a private household, 36 per cent were still in a private household at 30 months, 15 per cent had returned to residential or nursing home care or were in hospital, and 44 per cent had died. Among those who had been discharged to hospital, 11 per cent were still in hospital and 79 per cent had died.

2.3 Length of Stay of Elderly People who had left Residential or Nursing Home Care

Table 2.4 shows the mean number of days in residential or nursing home care for those individuals who had left residential or nursing home care during the 30 month period and the mean survival duration for those who died. Table 2.5 and figure 2.1 show the distributions of length of stay and survival. The length of stay has been computed as the number of days between admission and the first time of leaving residential or nursing home care. The figures on length of stay do not include time spent in residential or nursing home care prior to the admissions survey or subsequent periods of residential or nursing home care following readmission from a private household or hospital. The mean length of stay and survival duration are based on those individuals who had been in the home for no longer than 30 months from the date of admission recorded in the admissions survey.

The average length of stay for those elderly people who had left residential or nursing home care within 30 months was 234 days for those admitted to nursing beds and 333 days for those admitted to residential beds; 21 per cent of those admitted to nursing beds had left within the

first month, compared with 13 per cent of those admitted to residential beds. Among those who had left during the 30 months, 95 per cent of those admitted to nursing beds had died, compared with 84 per cent of those admitted to residential beds.

For elderly people who had died in the home, the mean length of stay was 240 days for those admitted to nursing beds and 367 days for those admitted to residential beds. Similarly, the mean length of stay for those discharged to hospital was shorter for those originally admitted to nursing beds (150 days) than to residential beds (204 days). Conversely, the mean length of stay for those who moved to a private household was shorter for those originally admitted to residential beds (83 days) than to nursing beds (100 days), although the latter figure was only based on 17 individuals.

Although a higher proportion of individuals admitted to nursing beds had died by the 30 month follow-up, 77 per cent compared with 59 per cent, the difference in death rates was only evident for the first four months after admission, as illustrated in figure 2.1. Among those who were admitted to a nursing bed and who died during the 30 month period, 48 per cent died during the first four months after admission, compared with 27 per cent of those who died having been admitted to a residential bed.

2.4 Demographic and Dependency Characteristics of Individuals on Admission

Tables 2.6, 2.7 and 2.8 present information on the demographic and dependency characteristics of individuals on admission, according to their location at the 30 month follow-up. The measure of mental confusion presented in table 2.7 is based on a grouping of the seven categories of the MDS CPS (Cognitive Performance Scale) (Morris et al., 1994): 'intact' corresponds to a score of zero; 'mild impairment' corresponds to a score of one, two or three; and 'severe impairment' corresponds to a score of four, five or six. Table 2.8 presents three aggregate measures of dependency: a modified version of the Katz Index of Activities of Daily Living, based on six self-care tasks (Katz et al., 1963); the Barthel Index of ADL, based on ten functions (Collin et al., 1988); and an aggregate measure of dependency originally devised by the Department of Health and Social Security for the 1970 Census of Residential Accommodation, which includes mobility, self-care functions, continence and mental confusion (Davies and Knapp, 1978). For the Barthel Index, a higher score (maximum 20) corresponds to a lower level of dependency.

Comparisons of the characteristics of individuals for whom information was not obtained at the 18 month follow-up with those for all individuals in the admissions survey indicated that they

were more likely to have been admitted from residential or nursing home care and less likely to have lived alone, and were more likely to have had higher levels of dependency (Bebbington et al., 1998). However, in this report the number of individuals for whom no information was obtained has been reduced by the inclusion of separate information obtained on deaths, as described in section 2.1. The effect of this has been to alter the profile of the individuals for whom no information was obtained: these individuals tended to have lower levels of dependency on admission than all individuals in the admissions survey. Those who were recorded in the report of the 18 month follow-up as having died comprised 39 per cent of all individuals in the admissions survey, compared with 61 per cent who were recorded as having died at 30 months. Thus, at the 30 month follow-up, the differences between those who were recorded as having died and all the individuals in the admissions survey have been reduced.

As at the 18 month follow-up, the elderly people who had died during the period up to the 30 month follow-up were older, and were more likely to be male and to have been admitted from hospital, than those who were still in a residential or nursing home or who had moved to a private household. They were also substantially more dependent on admission than those who were still in a residential bed or who had moved to a private household, in terms of mobility, the need for assistance with self-care tasks, continence and mental confusion. However, as in the 18 month follow-up, levels of dependency among those who were in a nursing bed were greater than among those who had died, and were substantially greater than levels of dependency among those who were in a residential bed.

As in the 18 month follow-up, individuals who were living in a private household at the 30 month follow-up had lower levels of dependency on admission than the individuals in the admissions survey as a whole. However, they were not less likely to have been living alone prior to admission or more likely to have been admitted from a domestic household or sheltered housing. At 18 months, levels of physical dependency on admission among those who had moved to a private household were greater than among individuals in a residential bed, but at 30 months the two groups were more similar in terms of physical dependency on admission. However, as at 18 months, the level of mental confusion on admission was lower among those who were living in a private household than among those in a residential bed.

Very few individuals who had moved to hospital remained alive at the 30 month follow-up, and thus comparisons between these individuals and those in other locations are not appropriate.

2.5 Change in Dependency between Admission and 30 Month Follow-Up

Table 2.9 presents information on changes in levels of dependency for individuals between admission and the 30 month follow-up, according to the type of bed to which they were originally admitted. Changes for individuals can be extremely heterogeneous (Jagger et al., 1993), and the assessment of changes over time is complicated by problems of measurement error, which will reduce the correlation between the two separate assessments (the regression towards the mean effect). For the Barthel Index, a difference of four points has been suggested as highly likely to represent a genuine change (Collin et al., 1988), although it should be noted that the assessments for the admissions survey and at the three follow-ups were undertaken by different personnel, and thus may be subject to additional measurement error. For the purposes of table 2.9, changes in the Barthel score correspond to changes of four or more points, whereas in the previous reports (Darton and Brown, 1997; Bebbington et al., 1998) changes corresponded to changes between four categories imposed on the index.

In the comparison of changes in dependency for individuals between admission and the six month follow-up, approximately 50 per cent of individuals were classified in the same category at admission and follow-up, with a slightly higher proportion of individuals being classified as having the same level of mental confusion than physical dependency, although the latter was classified into four categories. At 18 months, levels of dependency among those remaining in residential or nursing home care tended to be greater than on admission, particularly for physical dependency. In addition, changes in levels of dependency between the six month and 18 month follow-ups tended to be greater among those admitted to a residential bed than among those admitted to a nursing bed. Among those admitted to a residential bed, 36 per cent of those in the 18 month follow-up had a higher level of physical dependency than on admission, compared with 26 per cent of those in the six month follow-up, while among those admitted to a nursing bed the corresponding figures were 35 per cent and 30 per cent. In relation to mental confusion, 27 per cent of those in the 18 month follow-up who were admitted to a residential bed had greater levels of confusion, compared with 20 per cent of those in the six month follow-up, while among those admitted to a nursing bed the corresponding figures were 24 per cent and 22 per cent. Similarly, for those in the 30 month follow-up, and using a more rigorous definition of change in physical dependency, 43 per cent of those admitted to a residential bed had a higher level of physical dependency than on admission, compared with 35 per cent of those admitted to a nursing bed. However, 44 per cent of those in the 30 month follow-up who were admitted to a residential bed had greater levels of confusion, compared with 27 per cent of those in the 18 month follow-up, while among those admitted to a nursing bed the corresponding figures were 58 per cent and 24 per cent.

Table 2.1: Location of individuals at 6 month, 18 month and 30 month follow-ups

Location	*6 months*		*18 months*		*30 months*	
	No.	*%*	*No.*	*%*	*No.*	*%*
Total number of individuals	2544	100.0	2544	100.0	2544	100.0
Originally admitted to residential bed	890	35.0	651	25.6	469	18.4
Same type of bed	847	33.3	589	23.2	406	16.0
Moved to nursing bed/home	43	1.7	62	2.4	63	2.5
Originally admitted to nursing bed	568	22.3	331	13.0	231	9.1
Same type of bed	557	21.9	296	11.6	208	8.2
Moved to residential bed/home	11	0.4	35	1.4	23	0.9
Elsewhere	89	3.5	44	1.8	49	1.9
In hospital (bed not being kept open)	30	1.2	9	0.4	11	0.4
In private household	59	2.3	35	1.4	38	1.5
Died	743	29.2	1207	47.4	1552	61.0
No information	254	10.0	311	12.2	243	9.6

Table 2.2: Location of individuals at 6 month, 18 month and 30 month follow-ups, by type of bed to which originally admitted

Location	*6 months*				*18 months*				*30 months*			
	Admitted to residential bed		*Admitted to nursing bed*		*Admitted to residential bed*		*Admitted to nursing bed*		*Admitted to residential bed*		*Admitted to nursing bed*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Total number of individuals	1370	100.0	1174	100.0	1370	100.0	1174	100.0	1370	100.0	1174	100.0
In a residential or nursing home	890	64.9	568	48.4	651	47.5	331	28.2	469	34.2	231	19.7
In same type of bed originally admitted to	829	60.5	539	45.9	580	42.3	294	25.0	402	29.3	203	17.3
In another residential bed/home	18	1.3	11	0.9	9	0.7	35	3.0	4	0.3	23	2.0
In another nursing bed/home	43	3.1	18	1.5	62	4.5	2	0.2	63	4.6	5	0.4
Elsewhere	64	4.7	25	2.1	31	2.3	13	1.1	36	2.6	13	1.1
In hospital (bed not being kept open)	21	1.5	9	0.8	8	0.6	1	0.1	8	0.6	3	0.3
In private household	43	3.1	16	1.4	23	1.7	12	1.0	28	2.0	10	0.9
Died	261	19.1	482	41.1	500	36.5	707	60.2	717	52.3	835	71.1
No information	155	11.3	99	8.4	188	13.7	123	10.5	148	10.8	95	8.1

Table 2.3: Destination of individuals who had left residential or nursing home care within 30 months of admission, by location at 30 month follow-up (number of cases)

Destination	*Residential bed*	*Nursing bed*	*Hospital*	*Private household*	*Died*	*No information*	*All individuals*
Number of individuals	429	271	11	38	1552	243	2544
Destination							
Residential or nursing bed	417	263	-	-	-	-	680
Hospital	2	3	10	0	75	5	95
Private household	10	5	1	38	47	5	106
Died	-	-	-	-	1430	-	1430
No information	-	-	-	-	-	233	233

Table 2.4: Mean length of stay and survival of individuals who had left residential or nursing home care within 30 months of admission, by type of bed to which originally admitted (days)

Location	*All beds*		*Residential bed*		*Nursing bed*	
	Mean	*No.*	*Mean*	*No.*	*Mean*	*No.*
First destination						
Total number who left	-	1631	-	775	-	856
Individuals with information on date	280	1544	333	718	234	826
Discharged to hospital	190	81	204	60	150	21
Discharged to private household	87	70	83	53	100	17
Died	295	1393	367	605	240	788
Deaths						
Total number who died	-	1552	-	717	-	835
Individuals with information on date	301	1501	369	684	245	817

Table 2.5: Distributions of length of stay and survival of individuals who had left residential or nursing home care within 30 months of admission, by type of bed to which originally admitted (percentages of individuals who had left)

Length of stay/ survival	*All beds*		*Residential bed*		*Nursing bed*	
	All leavers	*Died*	*All leavers*	*Died*	*All leavers*	*Died*
Number of individuals	1544	1501	718	684	826	817
Length of stay/survival						
Under 1 month	18	15	13	9	21	20
1-2 months	11	11	8	8	13	13
2-3 months	8	8	7	7	10	10
3-4 months	5	5	4	3	6	6
4-5 months	5	5	5	5	5	4
5-6 months	4	3	4	4	3	3
6-7 months	4	4	3	3	4	4
7-8 months	2	2	3	3	2	2
8-9 months	3	3	2	2	3	3
9-10 months	3	3	3	4	2	2
10-11 months	2	2	2	2	2	2
11-12 months	2	2	3	3	2	2
12-14 months	6	7	6	7	6	7
14-16 months	5	5	6	6	4	4
16-18 months	3	3	4	4	2	3
18-20 months	4	4	4	5	3	3
20-22 months	3	4	5	5	2	2
22-24 months	3	3	4	5	2	2
24-26 months	3	4	5	6	2	2
26-28 months	4	4	5	5	3	3
28-30 months	3	4	3	5	2	3
0-30 months	100	100	100	100	100	100

Table 2.6: Demographic characteristics of individuals at admission by location at 30 month follow-up (percentages)

Demographic characteristics	*Residential bed*	*Nursing bed*	*Hospital*	*Private household*	*Died*	*No information*	*All individuals*
Number of individuals	429	271	11	38	1552	243	2544
Sex							
Male	25	24	64	21	32	24	29
Female	75	76	36	79	68	76	71
Age group on admission							
65-69	3	5	18	3	3	3	3
70-74	10	11	46	19	7	13	9
75-79	18	20	0	19	15	19	17
80-84	27	33	18	19	25	26	26
85 and over	43	31	18	40	49	39	45
Household composition							
Lived alone	71	56	71	64	63	62	64
Lived with others	29	44	29	36	37	38	36
Household tenure							
Owner occupied/mortgaged	32	30	29	35	29	33	30
Rented from LA/NT/HA	55	58	71	54	58	60	58
Privately rented	10	9	0	11	9	4	9
Other	3	3	0	0	4	3	4
Source of admission							
Domestic/sheltered household	46	32	45	32	30	32	33
Residential care	9	11	9	5	11	10	10
Nursing home	1	6	9	0	3	3	3
Hospital	43	50	37	60	55	53	52
Other	1	1	0	3	1	2	1

Table 2.7: Dependency characteristics of individuals at admission by location at 30 month follow-up (percentages)

Dependency characteristics	*Residential bed*	*Nursing bed*	*Hospital*	*Private household*	*Died*	*No information*	*All individuals*
Number of individuals	429	271	11	38	1552	243	2544
Mobility							
Walk outdoors	17	10	40	27	8	14	11
Walk indoors and stairs	16	10	10	5	9	16	11
Indoors on level/with aids	32	14	30	32	22	21	23
Walk indoors with help	19	20	10	5	22	14	20
Mobile in wheelchair	12	23	0	14	22	21	20
Chair or bedfast	4	23	10	16	17	14	15
Self-care (need assistance)							
Wash face and hands	32	57	27	26	54	43	49
Bath or wash all over	84	90	82	71	93	89	90
Dress	55	80	27	45	76	67	72
Feed self	10	25	9	11	27	21	23
Use WC	27	59	18	24	55	44	49
Transfer (bed/chair)	29	62	27	29	59	47	52
Continence							
Continent	57	31	64	45	35	49	40
Occasional accidents	29	34	36	39	31	28	31
Incontinent	15	35	0	16	34	23	29
Confusion							
Intact	23	17	10	30	18	27	20
Mild impairment	51	39	40	62	44	46	45
Severe impairment	26	44	50	8	38	27	35

Table 2.8: Measures of aggregate dependency of individuals at admission by location at 30 month follow-up (percentages)

Dependency measures	*Residential bed*	*Nursing bed*	*Hospital*	*Private household*	*Died*	*No information*	*All individuals*
Number of individuals	429	271	11	38	1552	243	2544
Amended Index of ADL							
No dependent functions	14	6	18	29	6	11	8
Dependent in bathing	24	7	46	24	11	16	14
1-4 dep/can transfer and feed	29	19	9	16	21	21	22
Dependent in transfer or feed	33	67	27	32	62	53	56
Barthel Index of ADL (grouped)							
Very low dep (Score 17-20)	26	7	46	32	9	17	13
Low dependence (Score 13-16)	30	16	27	24	18	25	21
Moderate dep (Score 9-12)	27	23	9	18	24	19	24
Severe dependence (Score 5-8)	14	33	18	11	24	24	23
Total dependence (Score 0-4)	3	21	0	16	24	15	19
DHSS 4-category							
Minimal	11	4	20	32	4	9	6
Limited	23	5	20	19	13	17	14
Appreciable	21	13	0	24	17	19	18
Heavy	44	78	60	24	66	55	62

Table 2.9: Change in dependency between admission and 30 month follow-up, by type of bed to which originally admitted (percentages)

Dependency at admission	*Type of bed originally admitted to/Change in dependency between admission and follow-up*[1]							
	Admitted to residential bed				*Admitted to nursing bed*			
	Lower	*Same*	*Higher*	*All (no.)*	*Lower*	*Same*	*Higher*	*All (no.)*
Barthel Index of ADL (grouped)								
Very low dependence (Score 17-20)	-	50	50	26	-	27	73	5
Low dependence (Score 13-16)	10	33	57	29	12	8	80	12
Moderate dependence (Score 9-12)	22	45	34	29	12	39	49	20
Severe dependence (Score 5-8)	36	41	24	14	13	57	30	37
Total dependence (Score 0-4)	46	54	-	3	21	77	2	25
All (number)	15	42	43	(435)	14	51	35	(205)
Confusion								
Intact	-	39	61	22	-	37	63	18
Mild impairment	18	42	40	52	7	44	49	36
Severe impairment	27	73	-	25	22	78	-	46
All (number)	19	37	44	(439)	12	30	58	(196)

Note: 1. For the Barthel Index of ADL, a change of 4 or more points is classified as a change in dependency (Collin et al., 1988).

Chapter 3
People who Leave Residential and Nursing Home Care

3.1 Introduction

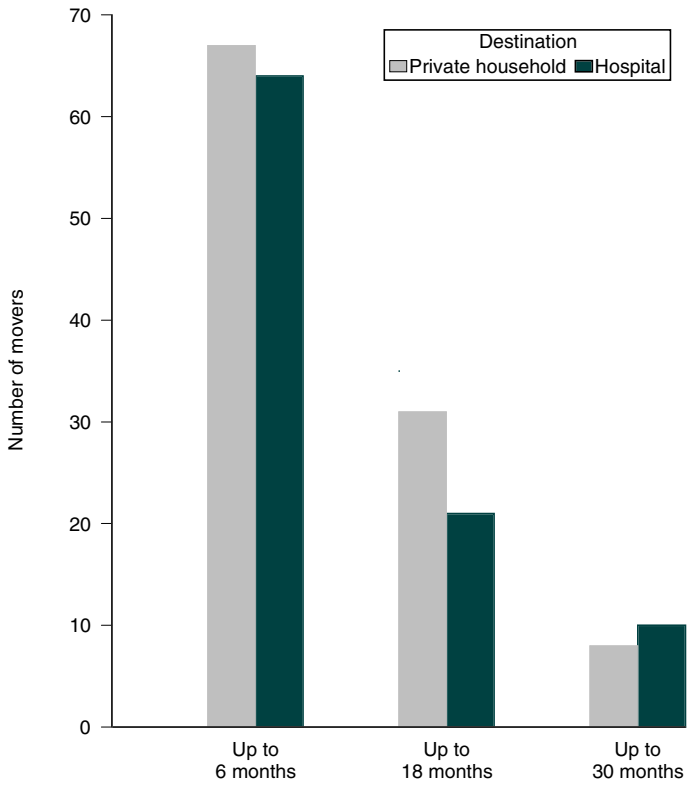
As part of the longitudinal survey of publicly funded residential and nursing home care, people from the admissions survey who were discharged have been tracked in order to establish survival and location and to obtain information on reasons for moving and their dependency levels. For those who had returned to the community, the amount of support being provided by social services departments was measured. This report gives information on all people discharged within 30 months of their admission, from data collected at the survey stage nearest to their first move out of care.

3.2 Incidence of Leaving Residential and Nursing Home Care

During the 30 months following admission, 201 people were discharged from the home to which they were originally admitted, that is 7.9 per cent of all admissions. 5.2 per cent of all admissions had left by 6 months, a further 2.0 per cent by 18 months and an additional 0.7 per cent by 30 months. This pattern was similar whether the destination of the move was a private household in the community or a hospital bed, the place in the home not being kept open (see figure 3.1).

Discharges are variable geographically. As shown in table 3.1, the counties have a higher incidence of discharges to the community than metropolitan or London boroughs and a lower incidence of discharge to hospital. This difference was significant at the 5 per cent level. In the London boroughs the numbers involved were small but the incidence of discharges to the community appeared significantly lower than in the rest of the country and discharges to hospital higher. This difference was significant at the one per cent level.

Figure 3.1 Moves from care, by time period*



* Includes those who subsequently died during the study period

3.3 Survival and location

Of the total of 201 people who moved out of their original placement within 30 months, 106 (4.2 per cent of all admissions) moved to a private household and 95 (3.7 per cent of all admissions) were discharged to hospital care (see table 2.3 in the previous chapter). The overall death rate for those leaving care was the same as that for all admissions, 61.0 per cent in the first 30 months. As would be expected the rate was much higher among those whose needs could not be met by residential or nursing home care and hence were discharged to hospital. 78.8 per cent of this group died. Far more of those who returned to live in the community survived the first 30 months. The death rate for this group, which was a more able group on admission, was 44.3 per cent.

The location of the survivors at 30 months was as follows:

- 18.9 per cent of all those discharged (1.5 per cent of all admissions) were living in a private household

- 10.0 per cent of all those discharged (0.8 per cent of all admissions) had returned to living in residential or nursing homes and
- 5.5 per cent of all those discharged (0.4 per cent of all admissions) were in long-stay hospital care.

3.4 Characteristics of People Leaving Residential and Nursing Home Care

A description of the kind of people who leave residential and nursing home care was given in the previous report (Bebbington et al., 1998) based on those people known to have been living in the community or in hospital care during the period between 6 months and 18 months after admission. Analysis of all the movers up to 30 months from admission on demographic and dependency measures and in relation to people's reasons for leaving the original home (see tables 3.2, 3.3 and 3.4) confirms the earlier findings.

In brief, people leaving care had a slightly younger age profile than average; whereas 29 per cent of all admissions were under the age of 80 on admission, 38 per cent of leavers (42 per cent of those returning to the community) were in this category. More men than average moved into hospital care and slightly more women than average returned to the community. Previous household composition was of no significance. Leavers had on admission shown lower levels of dependency on all the standard measures including confusion. Higher proportions of people who moved back to the community were independent on admission or were cognitively intact. This supports the finding that there was a minority of cases admitted with relatively short-term difficulties, related to a health crisis or accommodation problem capable of resolution. The need for rehabilitation had been a major reason for admission for 16 per cent of this group. A quarter of the people who subsequently returned to a private household had been admitted originally partly because of unsuitable domestic accommodation, homelessness or overcrowding.

At the final stage of the longitudinal survey the issue of the rehabilitation potential of residential and nursing home care will be examined at greater depth.

3.5 Service Implications

Examination of the amount of service support provided to people moving out of residential and nursing home care to live in a private household suggests that the burden on social service departments is not great. The numbers returning to the community by 30 months

were small (4.2 per cent of all admissions) and approaching half of these were dead by 30 months. During the tracking survey 10 per cent of cases were 'lost' to social services on discharge from the homes, in that there was no further contact. Analysis at the 18 month follow-up showed that approximately a quarter of survivors in the community at that point had no input from social services and it was known that in many of these cases informal care had taken over. In all, data on service receipt at the survey date nearest to the date of the person's discharge from the home was obtained for 31 cases out of the 106 discharged to a private household in the 30 months after admission. The majority of these cases were receiving support in the community by six months from admission, with only four new cases being added at 18 months and two at 30 months. The level of support within this group was moderately high, with an average per case of 12 hours of home care per week, three days per week day care and meals delivered on three days in the week (see table 3.5). The small numbers of people receiving services in the community at 30 months (0.4 per cent of all admissions) did not require intensive packages of care to maintain them. They received on average nine hours of home care per week.

Table 3.1: Incidence of discharges from residential and nursing home care, by type of local authority (numbers)

	Moved to private household	*Moved to hospital*	*All movers*	*All admissions*
Counties	65	43	108[1]	1218
Metropolitan boroughs	39	41	80	1062
London boroughs	2	11	13[2]	264
Total	106	95	201	2544

Notes: 1. Fishers Exact test p = .024.
2. Fishers Exact test p = .008.

Table 3.2: Demographic characteristics of people who had moved out of residential or nursing home care within 30 months of admission

Demographic characteristics	*Moved to private household*	*Moved to hospital*	*All movers*	*All admissions*
Number of individuals	106	95	201	2544
Age group (%)				
65-69	5	5	5	3
70-74	14	18	16	9
75-79	23	10	17	17
80-84	16	34	25	26
85+	42	34	38	45
Mean age	82	81	81	83
Gender (%)				
Male	26	37	31	29
Female	74	63	69	71
Household composition (%)				
Lived alone	61	70	65	63
Lived with others	39	30	35	37

Table 3.3: Dependency on admission of people who moved out of residential and nursing home care within 30 months of admission (n=201)

	Moved to private household %	*Moved to hospital* %	*All movers* %	*All admissions* %
Barthel Index of ADL (grouped)				
Very low dependence (Score 17-20)	26	22	25	13
Low dependence (Score 13-16)	26	28	28	21
Moderate dependence (Score 9-12)	19	26	22	24
Severe dependence (Score 5-8)	12	15	13	23
Total dependence (Score 0-4)	16	8	12	19
Confusion				
Intact	29	20	25	20
Mild confusion	52	50	51	45
Severe confusion	19	30	24	35
Amended index of ADL				
No dependent functions	24	10	18	8
Dependent in bathing	20	28	24	14
1-4 dependent functions/can transfer and feed	17	24	20	22
Dependent in transfer and feed	39	38	38	56
DHSS 4-Category				
Minimal	25	9	18	6
Limited	20	24	22	14
Appreciable	18	21	19	18
Heavy	37	46	41	62

Table 3.4: Major reasons for original admission for people who moved to private households or hospital care within 30 months of admission (percentages)

	Moved to private household	*Moved to hospital*	*All movers*	*All admissions*
Number of individuals	106	95	201	2544
Physical health	72	62	67	70
Mental health	36	46	41	44
Functional disablement	42	42	42	42
Carer stress	39	40	39	36
Lack of motivation	25	30	27	21
Accommodation problems	29	6	18	15
Need rehabilitation	16	8	12	6
Family breakdown	7	6	7	7

Table 3.5: Service receipt by those discharged to a private household within 30 months of admission

	Receiving services n=31		*Average amount per case receiving the service*
	No.	*%*	
Home care	27	87	12.3 hours per week
Day care attendance	7	52	2.8 days per week
Receiving respite care	9	29	60.9 days per year
Delivered meals	6	19	3.2 days per week
Day/night sitting	1	3	
Social worker visits	14	45	
Nursing visits	7	23	
OT visits	4	13	

Chapter 4
Mortality in Residential and Nursing Homes

4.1 Introduction

This chapter analyses mortality rates during the 30 months following first admission to a residential or nursing home by supported residents[1] aged 65+. It describes the numbers of deaths among those people admitted for the first time in the original survey, and the survival curve (to 30 months) for people admitted to residential and nursing beds. The main output is a model for predicting likely survival from the circumstances at the time of admission.

It is shown that:

- The median survival for the whole sample is 18.3 months (± 0.8 months). For those originally admitted to nursing homes it is 10.5 months (± 0.9 months), and for residential care is 25.3 months (± 0.9 months).
- Mortality rates are high initially, especially in nursing homes, but after about six months settle to around 2½ % per month (for the combined sample), rising slowly to about 3½ % by 30 months.
- The factors at admission that significantly raise subsequent mortality are, in order of their significance: having a malignancy (cancer), having a low Barthel score (high disability), old age, being a man, being admitted to a nursing home, being admitted from a hospital, having a respiratory illness.
- There are no significant differences between local authorities in survival outcomes, after taking into account other factors.
- As a few residents will live for a long while, the average length of survival is much greater than the median. At this stage it seems likely to be about 27-29 months. This will be important for resource planning.

An example is given of how to calculate expected survival given circumstances at admission.

This analysis precedes a more comprehensive investigation which will create a predictor of the expected life-time cost of care following a supported admission, given the circumstances at the time of admission.

[1] These are people who were assessed by social services departments in the PSSRU admissions survey and who were subsequently admitted to residential or nursing home care on a long-stay basis, on the assumption that part or all of their costs would be met by the social services department.

4.2 Deaths at 30 Months

The original sample consisted of 2577 people admitted between October 1995 and January 1996 in 18 local authorities. (This excludes a few from the original survey who were under 65 or for whom no date of admission as a long-stay resident is given)[2]. Information was originally supplied by the social workers responsible for assessment. Subsequently follow-ups were undertaken at one month (with the social worker) and at 6, 18 and 30 months (usually with the head of home). As far as practicable all people not known to have died were followed up at each stage, even those that had left the original home or returned to a private household. However a few people elected to drop out at the 6 and 18 month stages, and were not subsequently followed up.

Information on deaths was sought at each stage from the person providing the information. In addition a number of deaths were reported during the preparatory stages of the 6, 18 and 30 month follow-ups.

Immediately after the 30 month follow-up, the position was as follows:

Known to be alive	753
Known to be dead	1572
Uncertain	252
	2577

The uncertain group included those where the Care Home was not responding to our enquiries, those who were reported as having moved at various stages and had not been successfully recontacted, and those who had elected not to provide further information at the 6 or 18 month stage. Those electing not to provide information at 30 months are assumed to be alive at that stage.

It should be noted that since the 18 month report (Bebbington et al, 1998), a number of people previously reported lost have been traced at that stage, most of whom had died prior to the 6 month sweep. As a result, survival periods are somewhat lower than previously forecast, and the proportion of 'uncertains' is considerably less than before.

We do have some information about the 'uncertains'. All but 10 were tracked for some time beyond the initial point of admission, and we are able to say that each person was known to

[2] Included are 33 people first put on a waiting list by one authority, who were admitted between January and March 1996. This group is omitted in the analysis of chapter 2.

be alive up to a certain point. This information is of use to the survival models employed in this analysis. Another source of uncertainty is that of those known to have died, date of death is unknown for 52 (3%). For the purpose of the analysis that follows, a date of death has been imputed for each of these, chosen at random between the date at which they were last reported alive and the date at which their death was reported to us.

The effect of these uncertainties on the analysis is examined in section 4.5. It had been hoped to obtain information about survival of the 'uncertains' from the ONS Register of Deaths at this follow-up[3]. However, a question has been raised as to whether this research is eligible to access information from the National Health Service Central Register, without which the required information can only be obtained by laborious (and costly) investigation of individual records. If this question can be resolved, it is hoped this will enable the elimination of uncertainty about survival in time for the final (42 month) round of the research.

As this analysis is leading to an estimate of the total life-time cost following first admission as a supported resident, some individuals have been excluded from the remaining analysis in this chapter who appear not to be first-time admissions to supported care. This includes people identified in the admissions survey who were in fact transferring between residential and nursing homes, or moving between homes for other personal reasons. However we have retained those people transferring from a short-term place, those previously admitted on an emergency basis and those previously self-funding. This leaves 2386 people who are assumed to be first-time long-stay admissions to supported care, including all people who were living at home at the time of admission or who were admitted direct from hospital.

Table 4.1 contrasts the three groups, those who died, those who were alive at 30 months, and those about whom we are uncertain, in terms of a number of characteristics at the point of admission[4]. It should be noted that that sample losses are broadly similar to those for whom we know outcome at 30 months, but tend to have been slightly younger and more healthy at the outset. We will not discuss the data about deaths shown in table 4.1, but rather wait until section 4.5 where death rates are analysed.

[3] Except those who have elected not to continue providing information.
[4] See also table 2.6 for more detail about circumstances at admission and eventual outcome.

4.3 Survival Analysis

The remainder of the analysis in this chapter is based on standard life table methods, now commonly known as survival analysis. For example:

- Survivorship at say 6 months, is calculated on the basis of the number of deaths up to 6 months divided by the number of people known to have been at risk: that is all the people known to have been alive at least six months plus the people who died.
- The death rate at 6 months is calculated from the people who died between 6-7 months divided by the average number of people known to have been alive at during this period (conventionally, the number known to have been alive at 6 months less half the number with whom contact was lost between 6 and 7 months).

The virtue of this approach is that it takes account of information about people for as long as that information is available. For a general introduction to these methods, see for example Parmar and Machin (1995). The methods commonly centre on the calculation of the *hazard function*: the probability of dying in a short interval given survival up to that point. Hazard rates provide an approximation to the hazard function calculated over life table intervals: these are also known as life table mortality rates. They are normally very close to the death rates calculated as described above.

4.4 Survival and Mortality Rates

Table 4.2 shows the Kaplan-Meier survival curves calculated separately for people admitted to residential care (or a residential bed in a dual registered home) and to nursing homes (or a nursing bed in a dual registered home).

For people admitted to nursing homes, the median survival period is 10.5 months. The standard error of this median is 0.9 months. For those admitted initially to residential homes, the median survival period is 25.3 months also with a standard error of 0.9 months.

Table 4.3 shows the life table on a month by month basis for the first 30 months. This gives, for the combined sample, the cumulative probability of survival and the hazard (life table mortality) rates. The median is 18.3 months. The hazard rates are a bit variable, and there seems to have been under-reporting in the final month of each period (18 and 30 months). The general trend appears to be a rapid fall in the mortality rate during the first six months to a low of around 2.5 per cent per month, with some indication of a gradual rise thereafter to

around 3.5 per cent per month. Although not shown in table 4.3, it is worth noting that the initial fall is much steeper for people admitted to nursing homes, who suffer particularly high mortality in the first four months following entry.

4.5 Robustness of Estimates

It is of interest to consider whether the cases that have been lost to follow-up or whose date of death is unknown could have greatly affected the above estimates.

Two extreme possibilities might be considered for this group. The first is pessimistic: that everyone with whom we lost touch died immediately after the last date on which they were reported alive. The second is optimistic: that all those lost to follow-up are still alive, and all those whose date of death is unknown in fact died as late as possible, immediately before the date at which we were first told of their death. These possibilities would affect our estimates of median survival as follows:

	Median survival in residential care (months)	*Median survival in nursing homes (months)*
Pessimistic scenario	19.4	8.1
Central estimate	25.3	10.5
Optimistic scenario	28.0	11.8

It is evident from this that our estimates might be rather different if the people for whom we have incomplete information are very atypical in their outcomes.

It is unlikely that the true situation is as extreme as would be implied by either optimistic or pessimistic scenarios. What evidence we have suggests that the bias if any will be towards the optimistic scenario. We noted above, on the basis of table 4.1, that those lost to follow-up are not on the whole very different at the outset to the majority except for being slightly younger and less disabled. Eighteen per cent of those with unknown outcome were under 75, compared with 12 per cent of the remainder; and 43 per cent had a Barthel score above 12 compared with 33 per cent of the remainder. These differences are just statistically significant. As we shall see in section 4.6, both these factors affect subsequent survival, so it

is possible that median survival might be very slightly longer if those lost to follow-up did indeed survive slightly longer than others.

4.6 Factors Affecting Survival

The hazard rate can be used to provide a means of determining what effect certain factors at admission have on survival. In order to do this we have to assume *proportionality of hazards,* which is discussed further below.

Cox's proportional hazards model (Cox & Oakes, 1984) is a regression-like model for estimating the relative risk for each of a number of factors simultaneously, assuming proportionality of hazards. Table 4.4 shows the results of fitting this model to the risk factors listed in table 4.1. This analysis is based on 2349 individuals. The 39 who have been excluded are those who were never traced beyond the original survey, and those with missing information for any of the items in this table.

The final column of table 4.4 shows the relative risk of each factor. This column may be interpreted as follows:

- Women have a risk rate which is only 75% of men: in any short period they are only ¾ as likely to die (all else being equal, such as age, health at the outset etc).
- People admitted with a malignancy have a relative risk rate thereafter which is 2.26: in any short time period they are more than twice as likely to die as those who did not have a malignancy at admission.

And so on. To summarise table 4.4:

- The factors at admission that significantly raise subsequent mortality are, in order of their significance: having a malignancy (cancer), having a low Barthel score (high disability), old age, being a man, being admitted to a nursing home, being admitted from a hospital, having a respiratory illness.
- The factors at admission that significantly reduce subsequent mortality are: being younger, being a woman, being admitted to a residential home, having a high Barthel score, being admitted from another care home (many of whom are spend-down cases).
- Factors that make no difference (after other factors are allowed for) include region of residence, being diagnosed with dementia, depression, cardio-vascular disease, or admitted following a stroke, being incontinent.

The model of table 4.4 can be used to predict the survival of people with particular characteristics on entry. An illustration is given in table 4.5. For a woman aged 75-84, admitted to a nursing home from a hospital, with a Barthel score below 5 but no diagnosed illnesses in the above list, the median survival is likely to be 9½ months.

As well as regional effects, we also checked in a similar analysis for differences between local authorities in survival outcomes. After 30 months, there are quite large differences between local authorities in the proportion of survivors (after allowing for uncertains). This ranges from 45 per cent at best to 25 per cent at worst. However, after allowing for other circumstances at admission*, the differences in hazard rates between local authorities are not statistically significant* (Wald statistic = 19.6, df = 17, sig. level = 29.5%). This implies, but does not quite guarantee that there is no substantive difference in survival outcomes between authorities, since the analysis is based on an average of only 130 cases per authority. The two most extreme authorities are both in Inner London with lower than average cases.

4.7 Validity of Assumptions

The analysis of section 4.5 is based on an assumption about proportionality of hazards, and it is considered important to check that this is reasonably well satisfied, to confirm the validity of the method. Proportionality of hazards implies that although the hazard rates for the categories of key explanatory variables, such as people in residential and nursing homes, may differ through time, throughout they remain roughly in constant ratio to one another.

The usual check is graphical. It can be shown that if hazards are proportional, then plotting the logarithm of minus the logarithm of the cumulative probability of survival at each month, against the logarithm of time, then the resulting lines for each category of the key explanatory variables should be approximately parallel (Parmar & Machin, 1995, p139). Table 4.6 shows the results for each of the factors that is significant in table 4.4. These checks appear satisfactory. In no case do lines significantly far apart at one stage cross over. In other words, if a factor (such as gender) causes higher mortality at the outset, then it will continue to do so at least up to 30 months. For certain factors, notably type of bed, there is possibly some sign of convergence, suggesting that the effect of these factors on mortality may reduce through time. We have previously noted the very high initial mortality in nursing homes.

The vertical distance between lines in these graphs is indicative of the difference between the categories of the variable: thus whether or not the individual had a malignancy at the time of

admission is the variable with greatest effect on subsequent survival, as confirmed by table 4.4.

4.8 Conclusions

The above analysis gives an indication of the factors at admission that will affect typical length of life, and so length of stay in care homes. This is what matters in individual care planning. However, when planning in aggregate for the cost consequences of admissions, what is important to determine is not the median, but rather the expected, or average survival given these factors[5]. It is important to note that the average and median length of stay can be considerably different, due to a small proportion of people who may remain many years in a care home, and so who add to the overall average. In principle we will not know the actual average until the last person from this cohort has died, which might be as long as 25 years or more. However, as the number of people surviving becomes small, it is possible to make assumptions about will happen in future to the remainder, which enables an average to be calculated.

For example, we noted in section 4.4 that the hazard rate drops quickly during the first 6 months, and stays fairly level thereafter, though with a possible slight rising trend. If we suppose that after 30 months, the hazard rate will continue at the same average level of 0.0291 as between 7 and 30 months, then a long-term average can be calculated from table 4.3. With this assumption the average would be 29½ months (compared with 18½ months for the median).

However, with about one third of the original cohort still surviving, this estimate remains a little sensitive to the assumption about the future trend in the hazard rate. If the hazard rate remains at the level it reached between months 25-29, 0.0380 per month, then the average life expectancy would be just 27 months.

These estimates of average survival apply to the original sample taken as a whole, but it is straightforward to apply similar assumptions to the results from the model of table 4.4 to produce different estimates for people given their initial circumstances.

[5] Since the total expected costs is the expected length of stay multiplied by the average weekly cost. Probable changes in type of care which affect average weekly cost should also be taken into account, but forecasting average weekly costs are beyond the scope of the present chapter.

Table 4.1: Characteristics of admissions sample according to whether they were dead or alive at 30 months

	Dead %	*Alive* %	*Uncertain* %	*Total* (n)
Total Sample	60	30	10	2386
Area of origin				
Shire County	62	28	10	1158
Metropolitan District	59	31	10	1011
London	58	30	12	217
Gender				
Men	67	25	8	702
Women	58	32	10	1684
Age at admission				
65-74	52	34	13	296
75-84	57	33	10	1007
85+	66	26	8	1068
Initial placement				
LA home	50	42	8	213
Residential bed in P/V home	53	36	11	1128
Nursing bed	71	21	8	1045
Diagnosed illness on entry				
Dementia	61	31	8	914
Depression	59	32	9	313
Cardiovascular	64	29	7	462
Respiratory	72	22	6	345
Malignancy	83	10	7	193
Stroke	64	28	8	511
Incontinent (urine or faeces)	70	23	7	679
Barthel Score on entry				
0-4	77	16	7	427
5-8	63	27	10	556
9-12	61	31	8	576
13+	50	38	12	821
Source of admission				
Private household	56	35	9	854
Care Home	55	37	8	139
Hospital	65	26	10	1338
Other	63	26	10	38

Percentages are along rows (e.g. 67% of the original 702 men have died by 30 months). Figures in this table differ from those shown in chapter 2 because they include people tracked after leaving residential/nursing care, and some originally admitted from waiting lists, but exclude people who were not first-time admissions in the original survey.

Table 4.2: Kaplan-Meier survival curves for people admitted to residential and nursing beds

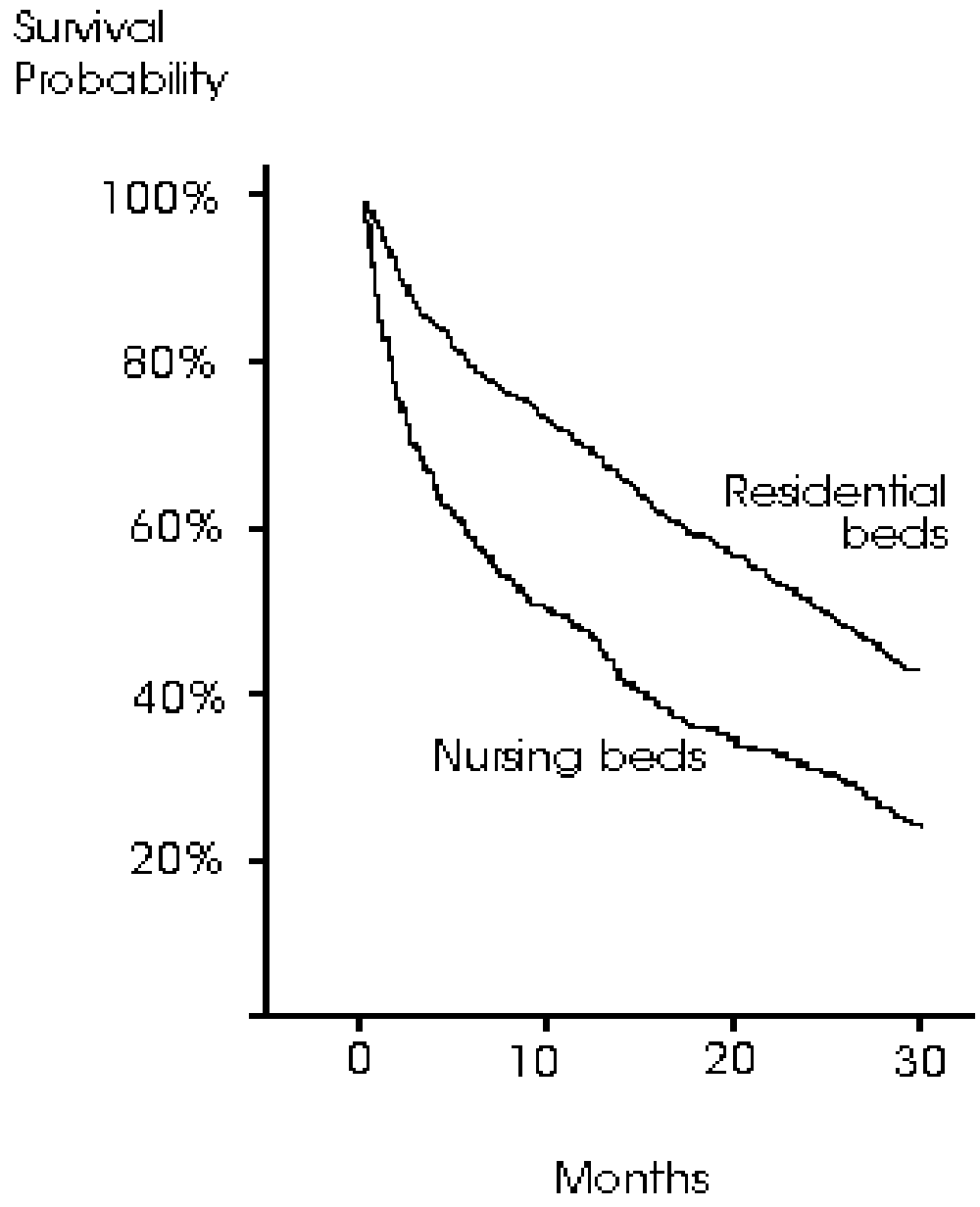


Table 4.3: Life tables for first time admissions to publicly funded residential and nursing homes during the first 30 months

Month	*Number at start of month*	*Number lost to study during month*	*Number exposed to risk*	*Deaths during month*[1]	*Proportion surviving Month*	*Cumulative proportion survivors*	*Hazard Rate*
1	2386	5	2383.5	213	0.9106	0.9106	0.0935
2	2168	75	2130.5	160	0.9249	0.8422	0.0780
3	1933	0	1933	112	0.9421	0.7934	0.0597
4	1821	0	1821	70	0.9616	0.7629	0.0392
5	1751	0	1751	72	0.9589	0.7316	0.0420
6	1679	0	1679	53	0.9684	0.7085	0.0321
7	1626	58	1597	54	0.9662	0.6845	0.0344
8	1514	0	1514	34	0.9775	0.6692	0.0227
9	1480	0	1480	33	0.9777	0.6542	0.0225
10	1447	0	1447	37	0.9744	0.6375	0.0259
11	1410	0	1410	29	0.9794	0.6244	0.0208
12	1381	0	1381	36	0.9739	0.6081	0.0264
13	1345	0	1345	50	0.9628	0.5855	0.0379
14	1295	0	1295	47	0.9637	0.5643	0.0370
15	1248	0	1248	44	0.9647	0.5444	0.0359
16	1204	0	1204	36	0.9701	0.5281	0.0304
17	1168	0	1168	34	0.9709	0.5127	0.0295
18	1134	1	1133.5	15	0.9868	0.5059	0.0133
19	1118	87	1074.5	30	0.9721	0.4918	0.0283
20	1001	1	1000.5	29	0.9710	0.4775	0.0294
21	971	3	969.5	21	0.9783	0.4672	0.0219
22	947	1	946.5	28	0.9704	0.4534	0.0300
23	918	0	918	22	0.9760	0.4425	0.0243
24	896	0	896	25	0.9721	0.4302	0.0283
25	871	0	871	26	0.9701	0.4173	0.0303
26	845	0	845	28	0.9669	0.4035	0.0337
27	817	1	816.5	30	0.9633	0.3887	0.0374
28	786	0	786	30	0.9618	0.3738	0.0389
29	756	0	756	31	0.9590	0.3585	0.0419
30	725	1	724.5	13	0.9821	0.3521	0.0181

[1] Month of death is imputed in 51 cases

Table 4.4: Proportional hazard model for factors affecting death rates (in first 30 months) in residential and nursing homes

	Model coefficient	*Standard Error*	*Wald test statistic*	*df*	*Sig at 1% level?*	*Relative Risk*
Area of origin			4.47	2	No	
Shire County	0.0000	-				1.00
Metropolitan District	-0.1193	0.0565				0.89
London	-0.0691	0.0976				0.93
Gender			23.87	1	Yes	
Man	0.0000	-				1.00
Woman	-0.2898	0.0597				0.75
Age at admission			47.50	2	Yes	
65-74	0.0000	-				1.00
75-84	0.2828	0.0930				1.33
85+	0.5682	0.0930				1.77
Initial placement			29.52	2	Yes	
LA home	0.0000	-				1.00
Residt'l bed in P/V home	0.0895	0.1074				1.09
Nursing bed	0.4303	0.1142				1.54
Diagnosed illness on entry						
Dementia	-0.0034	0.0571	0.30	1	No	0.99
Depression	0.0751	0.0806	0.87	1	No	1.08
Cardiovascular	0.0492	0.0676	0.53	1	No	1.05
Respiratory	0.2838	0.0739	14.74	1	Yes	1.33
Malignancy	0.8159	0.0872	87.67	1	Yes	2.26
Stroke	-0.0233	0.0668	0.88	1	No	0.98
Incontinent (urine or faeces)	-0.0644	0.0727	0.75	1	No	0.94
Barthel Score on entry			49.00	3	Yes	
0-4	0.7067	0.1050				2.03
5-8	0.2443	0.0850				1.28
9-12	0.2716	0.0748				1.31
13+	0.0000	-				1.00
Source of admission			12.92	3	Yes	
Private household	0.0000	-				1.00
Care Home	-0.0785	0.1232				0.93
Hospital	0.1800	0.0605				1.20
Other	0.3745	0.2155				1.45

Based on a Cox Proportional Hazard Model (see text for explanation). For Area, Gender, Age, Initial Placement, Barthel Score, Source of Admission; risks are relative to the group with a coefficient of 1.00. For Diagnosed illness and Incontinence, risks are relative to someone without this condition.

Table 4.5: Illustrative calculation of life expectancy in publicly funded residential/ nursing home care, given circumstances on admission

What is (a) the median expected survival; (b) the probability of surviving 12 months; for a person with the following characteristics?

	Coefficient from table 4.4
Living in shires	0.0000
Woman	-0.2898
Aged 75-84	0.2828
Admitted to nursing home	0.4303
No diagnosed medical conditions	0.0000
Incontinent	-0.0644
Barthel score 0 – 4	0.7067
Admitted from hospital	0.1800
Total score	1.2456

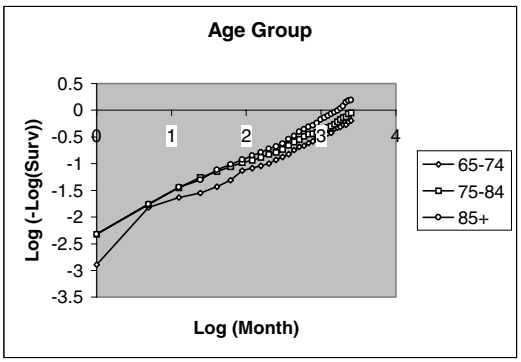
Hazard ratio 'r' (compared with general average) = exp(1.2456)/exp(0.7967) = 1.5666.
(Note that 0.7967 is the score at the average of all explanatory variables).

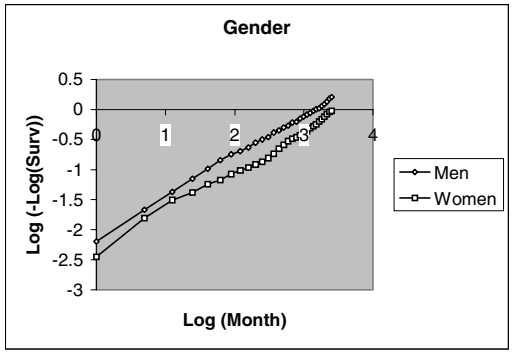
Probability of survival 'm' months can be estimated from = $\prod (2 - r.h_i) / (2 + r.h_i)$
where the product is over i = 1, …,m; and h_i denotes the monthly hazard rate as given in table 4.3. The following table shows the first 12 months of this calculation:

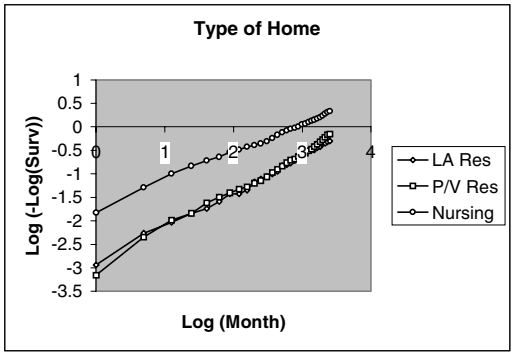
Month	*Hazard Rate* h_I	*Specific hazard rate* $r.h_i$	*Probability of surviving month* $(2-rh_i)/(2+rh_i)$	*Cumulative probability of survival*
1	0.0935	0.1465	0.8635	0.8635
2	0.0780	0.1222	0.8848	0.7641
3	0.0596	0.0934	0.9108	0.6959
4	0.0391	0.0613	0.9406	0.6546
5	0.0419	0.0656	0.9364	0.6130
6	0.0320	0.0501	0.9511	0.5830
7	0.0344	0.0539	0.9475	0.5524
8	0.0227	0.0356	0.9651	0.5331
9	0.0225	0.0352	0.9654	0.5146
10	0.0259	0.0406	0.9602	0.4942
11	0.0208	0.0326	0.9679	0.4783
12	0.0264	0.0414	0.9595	0.4589

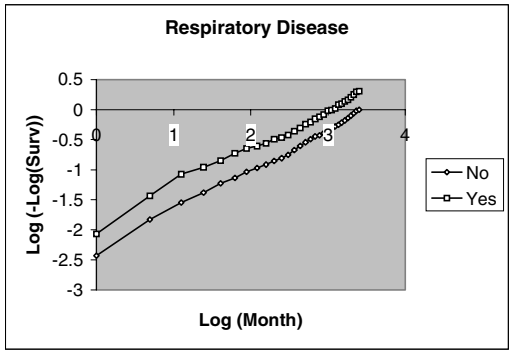
So (a) median expected survival is 9¾ months; (b) probability of surviving 12 months is 46 per cent.

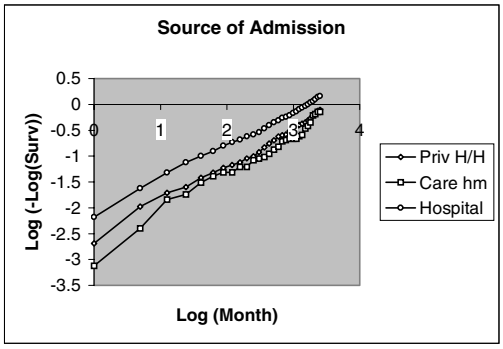
Table 4.6: Graphs of cumulative survival rates to check assumption of proportional hazards

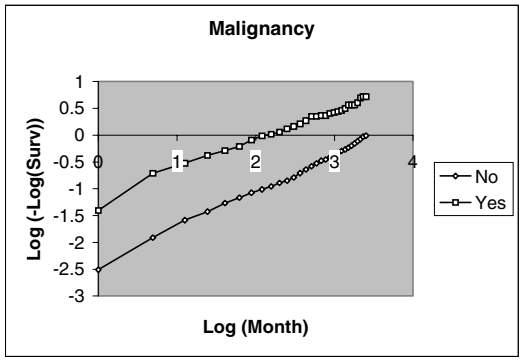


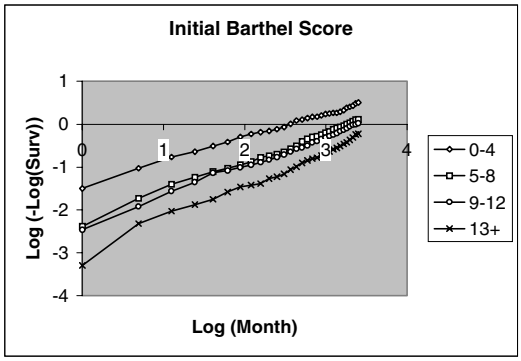












References

Bebbington, A., Brown, P., Darton, R., Miles, K. and Netten, A. (1998) *Survey of Admissions to Residential and Nursing Home Care. 18 Month Follow-Up*, PSSRU Discussion Paper No. 1428/2, Personal Social Services Research Unit, University of Kent at Canterbury.

Collin, C., Wade, D.T., Davies, S. and Horne, V. (1988) The Barthel ADL Index: A Reliability Study, *International Disability Studies*, **10**, No. 2, 61-63.

Cox, D.R. and Oakes, D. (1984) *Analysis of Survival Data*, Chapman & Hall, London.

Darton, R. and Brown, P. (1997) *Survey of Admissions to Residential Care. Analyses of Six Month Follow-Up*, PSSRU Discussion Paper No. 1340, Personal Social Services Research Unit, University of Kent at Canterbury.

Davies, B. and Knapp, M.R.J. (1978) Hotel and Dependency Costs of Residents in Old People's Homes, *Journal of Social Policy*, **7**, Part 1, 1-22.

Jagger, C., Spiers, N.A. and Clarke, M. (1993) Factors Associated with Decline in Function, Institutionalization and Mortality of Elderly People, *Age and Ageing*, **22**, No. 3, 190-197.

Katz, S., Ford, A.B., Moskowitz, R.W., Jackson, B.A. and Jaffe, M.W. (1963) Studies of Illness in the Aged. The Index of ADL: A Standardized Measure of Biological and Psychosocial Function, *Journal of the American Medical Association*, **185**, No. 12, 914-919.

Morris, J.N., Fries, B.E., Mehr, D.R., Hawes, C., Phillips, C., Mor, V. and Lipsitz, L.A. (1994) MDS Cognitive Performance Scale, *Journal of Gerontology: Medical Sciences*, **49**, No. 4, M174-M182.

Parmar, M.K.B. and Machin, D. (1995) *Survival Analysis: A Practical Approach*, Wiley, Chichester.