Issues of recruitment and maintaining high response rates in a longitudinal study of older hospital patients in England—pathways through care study

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Abstract

Study objectives—To describe and discuss the methods used to recruit and maintain an unbiased sample of older discharged hospital patients in a study of the process and outcomes of hospital care.

Design—Prospective longitudinal interview study of consecutive patients admitted to hospital over a 12 month period and followed up for six months. Interviews took place in hospital five days after admission, at home 10 days after discharge, and six months after admission.

Setting—Six hospital locations: three in the north of England and three in the south.

Participants—People aged 65 and over admitted to hospital with a new stroke or fractured neck of femur, their significant other, and nursing staff caring for them.

Main results—Of 3105 patients referred to the study, 2111 were eligible and 1671 (79%) were recruited. Recruited stroke patients were younger than those not recruited and rates differed between locations for both stroke and fractured neck of femur. By six months after admission 25% had died. Outcome data were obtained for 85% of the surviving patients. Patients who died were older and frailer before admission. Among survivors, outcome data for stroke patients were less likely to be obtained for men, those more able initially, and those who were married. Response rates to each interview differed according to respondent types. Interviews were more likely to be obtained with significant others than patients. Patients who were not able to be interviewed were older and frailer; significant others were less likely to be interviewed if the patients were younger and more able.

Conclusions—High response rates can be achieved with very frail older people if strategies are adopted to maintain their interest and if self reported data are supplemented by interviewing significant others.

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The confidence with which findings can be accepted and generalised on depends on how representative the initial and final samples are of the target population. Poor response rates at baseline are a potential source of bias, since non-respondents are likely to differ from respondents in important characteristics.¹ The potential magnitude of selection bias rapidly increases with decreasing response rates and measures to reduce the number of non-respondents are essential.² Attrition in longitudinal studies may introduce further biases, particularly if loss to follow up is differential with regard to important subject characteristics. Even where a sample is initially representative there is no assurance that it will remain so over time.^{3,4} There are two main reasons for attrition and it is important to distinguish between them: one is differential survival and the other is selective drop out.

POOR RESPONSE

Poor response in health surveys is associated with advancing age, low educational level, semi-skilled and unskilled manual occupations, and poorer health status,⁵⁻¹¹ although examples of the opposite can be found.¹⁰⁻¹² In older populations the prevalence of cognitive impairment increases and this affects a respondents' ability to complete an interview. Poor response is aggravated when the subject of study is acutely ill, for instance when they are patients early in a hospital stay. Reasons for refusal in this situation include: not feeling well, a general suspicion of studies, concern about signing consent forms, anxiety about being in hospital, and protective relatives.⁸ Patients may be confused and worried because of the stress of hospitalisation and the anxiety of wondering what will happen after discharge.¹³ Obtaining informed consent is a problem when subjects find it difficult to understand the nature and purpose of the research and to read and understand the language of consent forms. In addition, the ability to complete an interview may be affected by vision and hearing impairments.⁹

ATTRITION

In longitudinal studies differential survival is associated with poorer health status and increasing age. Selective drop out, due to refusal and other causes, is also associated with

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Prospective longitudinal studies are an important method of examining health policy issues.

poorer physical health, higher rates of intellectual impairment, and lower socioeconomic status.^{14 15} In studies of older people, attrition is critical because mortality, morbidity, and moving home are more likely to occur.^{14 16} Initial non-response and attrition are critical issues in studies of older people recruited in hospital and followed up after discharge. This paper describes the approach used to minimise initial refusal and subsequent drop out and looks at the potential biases introduced by these two factors in a prospective longitudinal study of older people admitted to hospital for an acute episode and followed up for six months. The study, "pathways through care", was commissioned by the Department of Health to examine the continuity of care between hospital and community, particularly from the perspectives of patients and their significant others. Although the discharge process was the focus of the study it was necessary to prospectively recruit patients at admission to hospital in order to observe the preparation for discharge and to ensure that the study population was representative of older people discharged from hospital.

Methods

DESIGN

A prospective longitudinal study was conducted in six non-teaching hospitals selected on theoretical grounds to illustrate different models of medical and orthopaedic care; to have sufficient admissions of study subjects over a 12 month period; and to serve populations with different socioeconomic characteristics.

STUDY LOCATIONS

Three locations were in the north of England. Two were industrial city areas with an above average proportion of local authority housing and unskilled workers and high levels of unemployment. The third northern location com-

KEY POINTS

- Prospectively collected inpatient information makes a significant contribution to our understanding of the hospital discharge process.
- Prospective study of the discharge process requires large resources in order to approach and recruit a sample that is sufficiently large and representative.
- Frail older people are willing respondents in longitudinal surveys provided appropriate strategies sensitive to their situation are adopted.
- In order not to disenfranchise the frailest subjects it is necessary to collect data from significant others as well.

prised a city with an average demographic structure surrounded by a very rural area with an older population. The three locations from the south of England included two south coast resort and retirement areas featuring a much older population and a low proportion of local authority housing. The third southern location was a growth area with a younger population and low unemployment.

STUDY POPULATION AND RECRUITMENT

Patients aged 65 or over admitted to study hospitals with a new stroke or with a non-pathological (ie non-metastatic) fractured neck of femur were eligible. New admissions were identified by contacting daily, usually by telephone, all the appropriate wards in each participating hospital to obtain the names of all eligible patients with a diagnosis of suspected stroke or fractured neck of femur. Five days after admission was chosen as the appropriate recruitment date to allow confirmation of diagnosis and for most patients to start to recover from the immediate trauma of both the event and admission to hospital. Patients were excluded if they died or were discharged before the admission interviews were due or the event had occurred while an inpatient. Patients who were too ill, as perceived by ward staff, at the time of the admission interview for their relatives to be contacted for consent were also excluded as it would have been ethically unacceptable to recruit dying patients. Patients who had a second admission with a study condition were not included a second time.

PATIENT CONSENT

Whenever possible, written consent was obtained from the patient themselves. If the patient was unable to respond principally because of memory or communication problems, consent to include them in the study was obtained from the next of kin and admission interviews were not conducted with the patient themselves. Consent was sought from next of kin because excluding those most affected by the event initially would have led to a biased sample at discharge.

Table 1 Interview time points

Interview type (time point)	Admission (5d after admission)	Discharge (d of discharge)	Discharge (10 d after discharge)	Outcome (6 mth after admission)
Respondent				
Patient	✓		✓	✓
Significant other	✓		✓	✓
Staff (hospital nurse)	✓	✓		

Table 2 Recruitment to the study

	Stroke No (%)	Fractured neck of femur No (%)	All No (%)
Referred to study	1645	1460	3105
Not approached:			85 (3)
Already in study	46 (3)	39 (3)	
Referred during halt in recruitment	11 (1)	10 (1)	
Referred during halt in recruitment	35 (2)	29 (2)	
Not eligible:	708 (43)	201 (13)	909 (29)
Died before admission interview	222 (14)	57 (4)	
Discharged before admission interview	55 (3)	54 (4)	
Too ill to be approached	67 (4)	19 (1)	
Too young	4 (0)	5 (0)	
Final diagnosis not stroke or fracture	360 (22)	66 (4)	
Eligible	891 (54)	1220 (84)	2111 (68)
Not recruited:	205 (23)	235 (19)	440 (21)
Refused	120 (13)	143 (12)	
Consent not obtained	85 (10)	92 (7)	
Recruited	686 (77)	985 (81)	1671 (79)

Table 3 Difference between locations in recruitment

	Location (%)						
	1	2	3	4	5	6	All
Stroke	n=161	n=191	n=131	n=132	n=183	n=93	n=891
Not recruited:							
Refused	11	17	10	24	8	10	13
Consent not obtained	6	8	3	4	22	11	10
Recruited	83	74	87	72	70	79	77
Fractured neck of femur	n=203	n=265	n=166	n=173	n=268	n=145	n=1220
Not recruited:							
Refused	10	11	8	27	6	13	12
Consent not obtained	6	13	4	3	10	5	7
Recruited	84	76	88	70	84	82	81

Using a χ^2 test there is an association between location and whether the subject was recruited to the study for stroke ($p<0.01$) or fractured neck of femur ($p<0.001$).

PARTICIPANTS

Data were collected from patients (subjects), significant others, and nursing staff caring for subjects. The significant other was the relative, friend, or member of staff (if the patient lived in a residential or nursing home) who knew most about the patient before admission. Significant others were identified at admission in the subject or nurse interview. Data were collected where possible from a significant other for each subject, not only to supplement data from subjects when they were unable to complete an interview because they were acutely ill but also as a data source in their own right to provide information on those aspects of a hospital stay and discharge that affect a significant other. If at any time a subject or a significant other on their behalf refused to take further part in the study they were not contacted again.

DATA COLLECTION

Interviews took place after admission, after discharge and six months after admission (table 1). The aim of admission interviews was

to obtain data about the circumstances surrounding the patient's admission, their status and living conditions before the stroke or fracture, present health status, and expectations for recovery and discharge. The nursing staff interview included a measure of the subject's functional ability (measured by the Barthel ADL index¹⁷) and of the level of confusion (measured by the confusion subscale of the modified Crichton Royal behavioural scale¹⁸). Discharge interviews with a hospital nurse took place as close to the time of discharge as possible to obtain details of the subject's hospitalisation and discharge. Interviews 10 days after discharge ascertained details about the subject's accommodation, service use, ability to perform everyday tasks, and details and perceptions of the discharge. Six month outcome interviews obtained information on the subject's living arrangements, service use, health status, functional abilities, and satisfaction. If a subject had been admitted to an institution after discharge and the significant other was a relative or friend, an additional outcome interview was conducted with a member of staff of the institution.

FACILITATING RESPONSE

Specially trained local lay people were employed as interviewers and were paid by the hour rather than per interview. This method of payment encouraged interviewers to allocate the time necessary to obtain interviews with frail, missing, or busy respondents. The interviewers were very carefully selected, trained, and managed. They underwent a standard five day training programme: three days spent at the research centre training in approaching and interviewing frail older people

Table 4 Admission characteristics of subjects who were discharged, for whom six month outcome data are or are not available

	Stroke			Fractured neck of femur			Significance levels*	
	Responders (n=407)	Lost by drop-out (n=57)	Died (n=62)	Responders (n=602)	Lost by drop-out (n=144)	Died (n=113)	Survival	Drop out
Age (y):								
Median	76	77	82	82	84	86	S p<0.0001	S p=0.76
Quartiles	71-82	71-83	78-86	76-86	77-88	81-89	F p<0.0001	F p=0.04
Gender (%):								
Male	45	49	37	14	15	17	S p=0.24	S p=0.51
Female	55	51	63	86	85	83	F p=0.54	F p=0.80
Marital status (%):†								
Married	42	60	39	22	20	18	S p=0.42	S p=0.01
Single/widowed/divorced/separated	58	40	61	77	80	82	F p=0.37	F p=0.57
Accommodation (%):†								
Private household	94	98	82	76	83	39	S p<0.001	S p=0.16
Institution	6	2	18	24	17	61	F p<0.0001	F p=0.07
Functional ability (Barthel score):†								
Median	8	10	4	9	10	4	S p<0.0001	S p=0.02
Quartiles	4-13	5-17	1-7	5-13	6-13	2-7	F p<0.0001	F p=0.76
Confusion (%):								
None	56	56	24	61	63	33	S p<0.0001	S p=0.90
Mild	15	14	21	10	10	11	F p<0.0001	F p=0.48
Moderate	7	11	10	11	7	11		
Severe	4	3	16	10	14	31		
Not recorded	18	16	29	8	6	14		
Location (%):								
1	21	25	8	18	15	18		
2	18	18	23	20	19	24		
3	17	15	21	15	19	12	S p=0.27	S p=0.04
4	13	26	18	10	15	15	F p=0.52	F p=0.14
5	19	14	19	24	25	19		
6	12	2	11	13	7	12		

* Significance levels are reported for subjects with stroke (S) and fractured neck of femur (F) using χ^2 tests or Mann-Whitney U tests with adjustment for ties as appropriate for survivors compared with non-survivors and drop outs compared with responders.

† Admission data was not available on marital status for 7 stroke and 9 fracture subjects, on accommodation for 4 and 8, and on Barthel for 16 and 16.

Figure 1 Audit trail of the study patients.

ple, busy relatives and hospital staff and two days spent in practice under supervision. Additional training days and monitoring of performance continued throughout the study. Interviewers were responsible for following up each of their subjects, ensuring they knew which ward they were on, when they were going to be discharged and where to. In a longitudinal study it is important to maintain goodwill in the hospital and the local community. One way to do this is to reduce the likelihood of causing distress and embarrassment by trying to contact subjects who have died. Deaths were monitored when visiting wards and by scanning the local papers for death notices and lists of death registrations obtained from the health authorities. Letters of condolence were sent which assured significant others they would not be contacted again. A database of all respondents was used to prompt interviewers when interviews were due and to allow the project team to monitor progress. Throughout the study, face to face interviews were used in preference to postal questionnaires to maintain response and interest. Nursing staff were informed of study progress by

sending three newsletters during the recruitment period. Patient and staff interest was maintained by sending Christmas cards to each subject if they had been discharged, and to each ward.

ANALYSIS

The data were analysed using SPSS to perform χ^2 tests or Mann-Whitney U tests (with adjustment for tied values) as appropriate. Non-recruitment bias was investigated within each diagnostic group with respect to gender, age, and location, which were the only variables available for all subjects referred to the study. Loss to follow up and interview response bias were investigated within each diagnostic group with respect to age, gender, marital status, accommodation before admission, functional ability, and confusion level as measured in the staff admission interview. Odds ratios (OR) and differences in medians (D) are reported together with their associated confidence intervals (CI).

Results

RECRUITMENT OF SUBJECTS

In total, 3105 patients were referred to the study: 1645 with an initial diagnosis of stroke and 1460 with a diagnosis of fractured neck of femur (table 2). Altogether 29% of notifications were not eligible for the study, mainly because they had died before interviews could be undertaken or because the diagnosis was confirmed to be other than a stroke or fractured neck of femur. Confirming eligibility was a particular problem for those initially identified as stroke patients where mortality was high in the early days after admission and diagnostic accuracy less certain. Of 891 patients with a stroke and 1220 patients with a fractured neck of femur who were eligible for the study, 21% were not recruited either because they refused or because they were too mentally or physically frail themselves to give informed consent and an appropriate next of kin was not traced in time to give consent.

NON-RECRUITMENT BIAS

Recruited stroke patients had a median age of 78 years (quartiles: 72, 84), while non-recruited patients were older and had a median age of 80 years (quartiles: 73, 84) (D 2; CI 0, 3). There was no difference in the age of recruited and non-recruited fractured neck of femur patients (median age 83 years, quartiles: 77, 88). Recruitment of eligible stroke patients was significantly higher in location 3 and lower in location 5 ($p < 0.01$) (table 3), while recruitment of fractured neck of femur patients was significantly higher in location 3 and lower in location 4 ($p < 0.001$). Fitting a log linear model confirmed the location effect was consistent across diagnoses. There were no differences between those not recruited and those recruited with respect to gender.

ATTRITION

Figure 1 shows an audit trail of subjects through the study. The aim of the study required a sample of discharged patients. Of

Table 5 Percentage of each type of interview obtained for subjects who were discharged and available at each time point

	Stroke (%)	Fractured neck of femur (%)
Admission interviews:	n=526	n=859
Staff	100	100
Patient	69	73
Significant other	90	85
Neither patient nor significant other	2	2
Discharge interviews:		
Staff	95	96
Post discharge interviews:	n=508	n=829
Patient	62	60
Significant other	84	76
Neither patient nor significant other	9	12
Outcome interviews:	n=440	n=687
Patient	71	65
Informal significant other*	38	23
Formal significant other†	27	31
None	8	12

* Relative or friend. † Staff in institution.

subjects recruited to the study over 80% were followed to discharge. Death was the main reason for loss before this point. Only 11 subjects refused further involvement. Outcome data were achieved for 77% of discharged subjects with stroke and 70% of discharged subjects with fracture. Attrition after discharge was mainly due to differential survival: mortality accounting for 12% of stroke and 13% of fracture subjects. Of the 458 surviving stroke patients and 733 fracture patients, outcome data were obtained for 89% and 82% respectively. Compared with those surviving, subjects who had died since discharge were older (stroke D=5; CI 3, 5; fracture D=3; CI 3, 5), more likely to be living in an institution before admission to hospital (stroke OR 3.5; CI 1.6, 7.4; fracture OR 5.5; CI 3.6, 8.3), to have poorer functional ability (stroke D=4; CI 2, 5; fracture D=4; CI 3, 5), and to have severe confusion at admission (severe/none: stroke OR 8.6; CI 3.4, 21.6; fracture OR 5.2; CI 3.1, 8.8) (table 4). The only differences between those for whom six month outcome data were obtained and those who had dropped out of the study were among subjects with stroke: data were less likely to be obtained for those with higher functional ability at admission (D=2; CI 0, 4), those who were married (OR 2.0; CI 1.1, 3.5) and those from location 4 (OR 2.4; CI 1.2, 4.6).

INTERVIEW RESPONSE RATE

Table 5 shows the proportion of each interview type that was obtained for discharged subjects at each time point according to the number of subjects still alive and resident locally who had not previously refused further participation. At admission and discharge the study aimed to interview both subjects and significant others. At these times fewer subjects than significant others responded. At outcome the aim was to supplement subject data only if necessary.

RESPONSE AT ADMISSION

Essential baseline data were collected in nursing staff interviews and therefore these were obtained for all subjects. For each diagnosis non-responding subjects were older (stroke D=3; CI 1, 4; fracture D=3; CI 2, 4), more likely to live in an institution (stroke OR

5.5; CI 2.7, 11.2; fracture OR 12.9; CI 9.0, 18.4), had much lower functional ability (stroke D=5; CI 4, 6; fracture D=6; CI 6, 7) and exhibited higher confusion levels (severe/none: stroke OR 28.5; CI 11.5, 71.0; fracture OR 147.8; CI 74.3, 294.2) (table 6). Interviews were more likely to be obtained with significant others of subjects who were less able, particularly when the patient had fractured their hip (functional ability D=2; CI 1, 3; living in institution OR 3.1; CI 1.8, 5.3; severe confusion OR 3.4; CI 1.6, 7.3) (table 7). Interviews were less likely to be achieved with significant others in location 5 (OR 1.8; CI 1.2, 2.6). Overall some preadmission data (from subject or significant other interviews) were obtained for 98% of subjects.

RESPONSE AT DISCHARGE

Interviews were more likely to be obtained with patients who were younger (stroke D=3; CI 2, 4; fracture D=3; CI 2, 4), who lived in a private household before admission (stroke OR 3.8; CI 1.8, 7.9; fracture OR 5.9; CI 4.2, 8.2), who had higher functional ability at admission (stroke D=3; CI 2, 4; fracture D=5; CI 4, 5) and less confusion at admission (none/severe: stroke OR 13.0; CI 5.0, 33.9; fracture OR 22.3; CI 12.4, 40.1). In addition, subjects with stroke in location 4 were less likely to respond (OR 1.9; CI 1.2, 3.2). Significant others were more likely to be interviewed if the subject had lower functional ability at admission (stroke D=2; CI 1, 4; fracture D=2; CI 1, 3) or were more confused at admission (severe/none: stroke OR 3.2; CI 0.7, 13.8; fracture OR 2.5; CI 1.4, 4.3). Interviews were also more likely to be conducted with significant others for subjects with fractured neck of femur who had lived in a nursing or residential home before admission (OR 3.1; CI 2.0, 4.9).

RESPONSE AT OUTCOME

Outcome interviews were conducted with the subject alone, if possible, but where appropriate supplemented with data from the informal significant other. If the subject was unable to respond the interview took place with the significant other. If the subject was residing in an institution at six months an interview was also conducted with a member of staff. An interview was more likely to be achieved with a subject or their informal significant other if the subject was younger (stroke D=4; CI 2, 6; fracture D=3; CI 2, 4), was admitted to hospital from a private household (stroke OR 6.9; CI 3.0, 15.6; fracture OR 8.9; CI 6.0, 13.3), had a higher functional ability at admission (stroke D=3; CI 1, 4; fracture D=4; CI 3, 5) and exhibited less confusion at admission (none/severe: stroke OR 12.6; CI 4.6, 34.2; fracture OR 16.8; CI 9.4, 29.9). Subjects for whom a member of staff was interviewed were older (stroke D=5; CI 3, 6; fracture D=4; CI 3, 5), more likely to be female (stroke OR 2.3; CI 1.5, 3.6; fracture OR 1.7; CI 1.0, 2.8), less likely to be married (stroke OR 0.2; CI 0.1, 0.4; fracture OR 0.3; CI 0.2, 0.4), more likely to have been admitted from an institution (stroke OR 39.8; CI 9.2, 171.4; fracture OR

33.7; CI 20.6, 55.2), had lower functional ability at admission (stroke D=6; CI 5, 7; fracture D=5; CI 4, 5), were more likely to be severely confused at admission (severe/none: stroke OR 12.5; CI 4.5, 34.9; fracture OR 18.2; CI 10.1, 32.5). These differences reflect

the characteristics of subjects in institutions as compared with those living in private households. It is not possible to undertake these analyses within residence type, as place of residence is not available for those who were not interviewed.

Table 6 Characteristics of subjects who were discharged and for whom a patient admission interview had been obtained

	Stroke		Fractured neck of femur		Significance levels*
	Responders (n=361)	Lost by drop-out (n=165)	Responders (n=625)	Lost by drop-out (n=234)	
Age (y):					
Median	76	79	82	85	S p<0.0001
Quartiles	71-82	73-85	76-86	80-89	F p<0.0001
Gender (%):					
Male	46	40	16	13	S p=0.20
Female	54	60	84	87	F p=0.29
Marital status (%):†					
Married	45	43	23	16	S p=0.70
Single/widowed/divorced/separated	55	57	77	84	F p=0.03
Accommodation (%):‡					
Private household	97	84	87	34	S p<0.0001
Institution	3	16	13	66	F p<0.0001
Functional ability (Barthel score):§					
Median	9	4	10	3	S p<0.0001
Quartiles	6-15	1-7	7-13	1-6	F p<0.0001
Confusion (%):					
None	69	15	77	8	S p<0.0001 F p<0.0001
Mild	16	13	9	11	
Moderate	5	15	7	19	
Severe	2	13	3	43	
Not recorded	8	44	4	19	
Location (%):					
1	20	18	16	21	S p=0.14 F p=0.09
2	19	19	19	24	
3	15	22	16	13	
4	14	18	13	9	
5	20	15	24	20	
6	12	8	12	13	

* Significance levels are reported for subjects with stroke (S) and fractured neck of femur (F) using χ^2 tests or Mann-Whitney U tests with adjustment for ties as appropriate.

† Marital status was not recorded for 7 stroke or 9 fracture subjects.

‡ Accommodation was not recorded for 4 stroke or 8 fracture subjects.

§ Barthel was not recorded for 16 stroke or 16 fracture subjects.

Table 7 Characteristics of subjects who were discharged and for whom a significant other admission interview had or had not been obtained

	Stroke		Fractured neck of femur		Significance levels*
	Responders (n=473)	Lost by drop-out (n=53)	Responders (n=727)	Lost by drop-out (n=132)	
Age (y):					
Median	77	76	83	80	S p=0.02
Quartiles	72-83	68-75	77-87	74-84	F p<0.001
Gender (%):					
Male	44	47	14	20	S p=0.64
Female	56	53	86	80	F p=0.05
Marital status (%):†					
Married	44	45	21	24	S p=0.83
Single/widowed/divorced/separated	56	55	79	76	F p=0.41
Accommodation (%):‡					
Private household	92	98	70	88	S p=0.11
Institution	8	2	30	12	F p<0.001
Functional ability (Barthel score):§					
Median	7	8	8	11	S p=0.40
Quartiles	4-12	3-14	5-12	7-15	F p<0.0001
Confusion (%):					
None	51	58	55	75	S p=0.66 F p<0.001
Mild	15	13	10	8	
Moderate	8	4	11	5	
Severe	6	8	15	6	
Not recorded	20	17	9	6	
Location (%):					
1	19	26	18	14	S p=0.01 F p<0.001
2	19	11	21	15	
3	19	6	15	16	
4	15	17	11	16	
5	17	32	21	35	
6	11	8	14	4	

* Significance levels are reported for subjects with stroke (S) and fractured neck of femur (F) using χ^2 tests or Mann-Whitney U tests with adjustment for ties as appropriate.

† Marital status was not recorded for 7 stroke or 9 fracture subjects.

‡ Accommodation was not recorded for 4 stroke or 8 fracture subjects.

§ Barthel was not recorded for 16 stroke or 16 fracture subjects.

Discussion

The method of identifying subjects early in their admission enabled complete enumeration of the target sample, although the drawback was the high number of ineligible subjects. This study was highly successful in recruiting subjects. The difference in recruitment between locations was mainly due to differences in the degree of success that interviewers had in identifying and gaining consent from significant others of subjects who were unable to give consent. This was a particular problem in location 5, a retirement area where subjects were less likely to have relatives living in the area. This was also seen in the lower rate of significant other interviews obtained at admission in this area. In location 4 the refusal rate was double that of the other locations. This particular hospital had problems with bed shortages and changes in organisational structure which resulted in subjects undergoing more ward moves, often to wards specialising in the care of other conditions. This might have affected subjects' willingness to take part in the study. Fewer interviews were obtained with stroke subjects in location 4 at discharge, although it is not clear whether this is related to the problems in the hospital or to other characteristics of the population.

It may be that a slightly higher response rate could have been achieved if interviewers had been members of staff wearing identifiable uniforms rather than lay interviewers. However, the research team felt that respondents would be more likely to give unbiased views of the processes of hospital care to people who were not seen as part of the organisation. The training programme and monitoring of performance of interviewers were an essential feature of the successful response rates. Evaluations have been conducted of different methods of conducting surveys, by mail, telephone, or face to face,^{19 20} and of the effect of race or gender of interviewer for sensitive studies.^{21 22} However, there is a dearth of experiments reported in the literature confirming the effects of utilising different techniques for improving the response rates and reducing attrition in interview surveys.

A high mortality rate in the study population was expected with subsequent loss to the discharge population. However, the study was also successful in following discharged patients up to outcome. Although the attrition rate appeared high at 23% for subjects with stroke and 30% for subjects with fractured neck of femur, most of this was due to differential survival rather than selective drop out. As expected those that died were frailer at admission than those that survived. Excluding loss due to death, outcome data were obtained for nearly 90% of subjects with stroke and over 80% of subjects with fractured neck of femur. The response rates to individual interviews were very high, particularly considering the extreme frailty of some of the subjects at admission, but also indicate the high proportion of initial data that would have been

lost if interviews had not been conducted with significant others as well as subjects. Interviews with significant others were more likely to be obtained for frailer subjects. This may be because subjects who were less active before admission were more likely to have a close support network and were able to identify a significant other. Significant other interviews were particularly useful for information about subjects who were not interviewed. Among these subjects there were no differences between those for whom a significant other did respond and those for whom there was no significant other interview.

The time and effort put into maintaining contact with this extremely frail group of older people and their significant others was rewarded by the high response rates achieved and the low amount of attrition due to refusal. The very high response rates achieved with busy nursing staff are a sign not only of the success of the study protocol but also of the dedication of interviewers and of the commitment and interest of nursing staff. The methods used in this study to reduce attrition such as sending Christmas cards and newsletters should be formally evaluated. However, the benefit of high response was obtained at a higher cost of paying interviewers by the hour rather than by the interview and the effort of identifying a large number of people who were subsequently ineligible. This study indicates that it is essential to supplement data from older frail subjects by data from their significant others if the most frail are not to be totally disenfranchised. Further investigation is needed of the differences and similarities between responses from subjects and their significant others where both were interviewed.

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