

Critical Role of Functional Decline in Delayed Discharge from an Acute Geriatric Unit

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Abstract

Introduction: Delayed hospital discharge of elderly patients after an acute illness poses significant problems, including bed-blockade, iatrogenesis, and increase in morbidity, dependency and social isolation. The aim of this study was to determine the factors associated with delayed discharge from an acute geriatric unit. **Materials and Methods:** This was a prospective cohort study involving 172 consecutive non-institutionalised patients, 65 years and older, admitted to an acute geriatric unit. The medical, functional, psychological and social variables of each subject were documented and any decline in functional status recorded. Based on the discharge status, patients were dichotomised into the “delayed” and “non-delayed” groups. Initial bivariate analyses of the variables were performed to select those associated with the “delayed discharge” group at the $P < 0.05$ levels. These variables were in turn entered into a multivariate logistic regression model to identify factors significantly associated with delayed discharge. **Results:** Forty-eight patients (27.9%) had their discharge from the acute geriatric care unit delayed despite clinically fit to be so. Variables significantly associated with delayed discharge in the multivariate model were: 1) decline in basic activities of daily living (ADL) status [$P < 0.001$; adjusted odds ratio (AOR), 3.63; 95% confidence interval (CI), 1.33 to 9.86] and 2) need for skilled nursing [$P = 0.012$; AOR, 4.57; 95% CI, 1.88 to 11.14]. **Conclusions:** The study demonstrates the central importance of effectively identifying elderly patients who are at risk of delayed discharge after acute hospitalisation through a multi-disciplinary focus on illness-induced functional decline. It is likely therefore that proactive approaches to rehabilitation and caregiver training, and adequate community-based services, may facilitate early and effective return of these patients to their homes, thereby reducing inappropriate use of acute beds.

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Key words: Activities of daily living, Discharge planning, Elderly, Hospitalisation, Skilled nursing

Introduction

In the last decade, many countries have experienced alarming transformation in their demographic patterns, with the elderly population emerging as the fastest growing segment of the population. Owing to their generally poorer health status in terms of chronic illnesses and long-term disability, the elderly consume a disproportionate amount of medical and social services, placing tremendous strain on almost every health care system.¹ Acute hospital services constitute the costliest segment of health care budgets, and any initiative aimed at efficient use of limited health care resources will have to pay close attention to inappropriate utilisation of hospital beds by older patients, particularly through the unnecessary delays in hospital discharge after

resolution of the acute clinical problems.

Delayed discharge of the hospitalised patient poses significant problems to the health care system over and beyond the increased cost of health care. Iatrogenic complications have been shown to be extremely common for elderly patients with long lengths of hospital stay,² of which nosocomial infection is a notable example. The interactions among acute illness, natural ageing and the hospital environment produce significant and frequently irreversible decline in functional status, leading to further morbidity and disability.³⁻⁵ From a psychosocial perspective, the extended period of acute hospitalisation can be detrimental to the patient, by increasing social isolation and fostering dependent relationships.⁶ In addition, delayed

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discharge increases the incidence of “bed blockade”,⁷ where acutely ill patients are being held up at the Emergency Department and prevented from receiving early inpatient treatment.

The above provided the rationale for our conducting a prospective study on delayed discharge in a cohort of consecutive admissions to an acute geriatric unit. The main aims of the study were to determine the incidence of delayed discharge and to identify the factors associated with the problem. Although there have been previous studies on this subject, few have been prospective,⁸ and even fewer were carried out in acute geriatric medical wards. The ultimate objective of our work was to ascertain the potentially remediable areas of delayed discharge amenable to practical and effective interventions.

Materials and Methods

Study Design and Subjects

This was a prospective, observational study which recruited consecutive patients, 65 years of age and above, admitted over a 4-month period, from December 1996 to March 1997, to the acute geriatric service of the Department of Geriatric Medicine, Tan Tock Seng Hospital, Singapore. Each subject was enrolled only once during the period of the study. Excluded from the study were patients from long-term care institutions (we intended to limit the study to factors that influenced delayed discharge into the community) and patients who died during the hospitalisation (and hence, never achieved fitness for discharge).

For administrative and service considerations beyond the control of the study design, the patients were divided into 5 groups according to their bed location, and were assessed and managed separately by 5 teams of doctors, each led by an attending geriatrician-in-charge. A semi-structured protocol documenting the subjects' medical, functional, and social variables (Table I) was administered to each study-participant by the respective geriatricians-in-charge, all of whom underwent a training session to standardise data-capture.

In all cases, arrangements were made to meet the main caregiver(s) within 48 hours of admission so as to document the relevant variables as well as to formulate early the patient's discharge plans. Also in every case, the main caregiver was given at least 24 hours notification of the patient's discharge prior to the designated date of leaving the hospital.

Study Variables

“Delayed discharge” in this study was defined as any delay in the discharge of the patient beyond the date when he or she was deemed fit for discharge. The date of fitness for discharge for each patient was determined clinically by

TABLE I: VARIABLES STUDIED (PATIENT-LINKED)

Demographic
•age
•gender
•ethnic group
Social
•caregiver status
•paying status of hospitalisation
•type of accommodation
•any live-in companion
Medical
•number of active (acute and chronic) medical problems
•length of hospital stay
•medications
Functional
•basic activities-of-daily-living (ADL) status [Katz]
•instrumental ADL status [Lawton]
•ambulatory status
•cognitive status [abbreviated mental test (AMT) score]
•requirement for skilled or specialised nursing care (existing and new items)

the geriatrician-in-charge, according to recovery and stabilisation of the patient's medical and functional status, taking also into consideration for this decision-making, relevant input from the various therapists. This date was then designated the “date of fitness for discharge” and any discharge later than this date, regardless of its reasons, was thus labelled a “delayed discharge”.

The incidence of delayed discharge, the number of days of delayed discharge, and the different directly patient-linked factors associated with the delay were studied. These factors are shown in Table I and were thought to be relevant based on prior clinical experience. They comprised patients' demographic, social, medical, and functional variables. Social variables included the patient's socio-economic status and support system upon discharge from the acute hospital. The former was assessed indirectly by looking at paying status for the hospital stay (self paying or state-subsidised), and type of housing (private or public), while level of social support included variables such as the availability of live-in-companion, and of caregivers. Medical variables comprised the extent of medical comorbidity, measured by the number of acute and chronic medical conditions on active monitoring and/or treatment, and the presence of significant psychiatric illness, as reflected by whether the patient was on any regular psychotropic medications. Lastly, the actual total length of stay was calculated for each patient.

Cognitive status was assessed using the 10-question Abbreviated Mental Test (AMT).⁹ Using the optimal cut-off value of 7/8 obtained in a local validation study,¹⁰ the patients were categorised into cognitively impaired (AMT

≤7) and non-cognitively impaired (AMT >7). Also included in the cognitively impaired group were patients with known diagnosis of dementia. Ambulatory status was graded into “independent (with or without aid)”, “requires assistance or supervision”, or “immobile”, while activities of daily living (ADL) status referred to subjects’ ability for basic self-care, and was assessed using the 6 basic ADL items according to Katz.¹¹ “Decline” in ambulation and ability for basic self-care were additional variables that looked at any downgrading in patient’s performance status in each of these items, comparing the pre-discharge with the pre-morbid states. Skilled nursing in this study referred to the need for trained nursing care for patients, including tube feeding, wound dressing for pressure ulcers, clean intermittent urinary catheterisation, and administration of subcutaneous injections.

Finally, for patients with delayed discharge, the main reason leading to the delay for each patient, as determined by the multi-disciplinary team managing the patient, was also documented. These social-related reasons were grouped into 4 mutually exclusive categories (Table II): (1) the need for caregiver training in specialised nursing care, (2) caregivers not being ready to take the patient home (even after they had received any necessary training)—this was termed as social difficulties, (3) waiting for nursing home placement and (4) waiting for beds in step-down care facilities or community hospitals.

Statistical Analysis

Based on the subjects’ actual discharge dates, they were dichotomised into 2 main groups; “delayed” and “non-delayed”. As a data-reducing step, bivariable statistical analyses of the relationships between the aforementioned variables and delayed discharge were performed to select those factors associated with the delayed discharge group at the $P < 0.05$ level. These significant factors were then entered into a variable selection procedure of the logistic regression model using the SPSS statistical package (SPSS for Windows, version 7.5. Chicago, Illinois: SPSS Inc.; 1997), [entry at $P < 0.05$, removal at $P > 0.10$] to identify factors most strongly associated with delayed discharge in a multivariate model.

TABLE II: REASONS FOR DELAYED DISCHARGE (SOCIAL-LINKED)

Reason	n	Days (sum)	Days (median)
Social difficulties	23	46	2.0
Need for caregiver training	10	56	5.0
Awaiting bed in community hospital	10	97	8.5
Awaiting long-term care facilities	5	34	5.0

Results

A total of 207 patients age 65 or older were admitted during the study period. Of these, 25 (12%) were from institutions and another 10 (5%) died during the admission. These patients were excluded, leaving a cohort of 172 for analysis. The median age of the cohort was 82 years, with a range of 65 to 101 years; 65.7% were female and the predominant ethnic group was Chinese (89.5%). Other demographic characteristics are listed in Table III.

In total, these 172 patients accounted for 2427 patient-days, giving rise to an average length of stay of 14.11 days per patient. Based on their discharge from the acute hospital, these patients were dichotomised to the “delayed” and “non-delayed” groups as defined above. A total of 48 (27.9%) had their discharge from the acute hospital delayed despite resolution or stabilisation of their medical and functional problems. The delays accounted for 233 days (9.6% of the total); each of these “delayed” patients had their hospitalisation in the acute hospital extended by an average of 4.85 days (Table IV). The primary reasons documented for each “delayed” patient were analysed and are listed in Table II. Caregivers in 23 of the 48 cases were “unprepared” for their wards’ discharge despite resolution or stabilisation of the subjects’ medical problems. Hospitalisation was extended in 10 cases after patients achieved fitness for discharge to allow training of caregivers in skilled nursing. Ten cases that were referred to step-down care facilities by the multi-disciplinary team based on their need for continuing inpatient rehabilitation and subacute medical care had their discharge delayed by bed shortages in the community hospitals. Each of these patients had to wait in the acute hospital for an average of 9.7 days, before the actual transfer took place. Finally, in another 5 cases, the inability of the caregivers to cope with the patients’ care, or simply the unavailability of caregivers, resulted in the need for placement in long-term care facilities. Each of these patients had to wait for an average of 6.8 days after resolution of their medical problems before a place was available for transfer to the nursing home.

Bivariate analyses were carried out as a preliminary procedure to reduce the number of variables to be entered into the multivariate model. The factors that were significantly associated with the outcome of “delayed discharge” (Table V) included functional factors at discharge such as dependence in mobility ($P = 0.004$), and in basic self-care ($P = 0.007$), decline in ability for basic self-care ($P < 0.001$), decline in ambulatory status ($P = 0.002$), and increased requirement in skilled nursing ($P = 0.004$). Patients who had delayed discharge had a higher count of active medical problems (4.5 versus 3.8; $P = 0.037$), and a higher prevalence of cognitive impairment as defined above ($P = 0.043$).

TABLE III: PATIENT CHARACTERISTICS AND DISTRIBUTION ACCORDING TO EVENTUAL DISCHARGE STATUS

	Discharge status		
	Total (n = 172)	Delayed 48 (27.9%)	Non-delayed 124 (72.1%)
Sex			
Male	59 (34.3%)	18	41
Female	113 (65.7%)	30	83
Mean age (y)	81.6 ± 7.0	82.4 ± 7.8	81.3 ± 6.7
Race			
Chinese	154 (89.5%)	43	111
No. of medical problems (median)	4.0	5.0	3.0
AMT score (max 10)	5.6 ± 3.4	4.8 ± 3.2	5.9 ± 3.5
Housing			
Private	27 (15.7%)	6	21
Public	145 (84.3%)	42	103
Living alone	5 (2.9%)	2	3
Payment of hospitalisation cost			
Self-paying	20 (11.6%)	6	14
State-subsidised	152 (88.4%)	42	110
On psychotropic medication	47 (27.3%)	14	33
Mobility at the point of admission			
Immobile	40 (23.3%)	14	26
Needs help	53 (30.8%)	16	37
Independent	79 (45.9%)	18	61
Ability for basic self-care at the point of admission			
Totally dependent	61 (35.5%)	18	43
Partially dependent	13 (7.6%)	4	9
Independent	98 (56.9%)	26	72
Requires skilled nursing at the point of admission	17 (9.9%)	8	9
Urinary incontinence at the point of admission	45 (26.2%)	12	33
Mobility at the point of discharge			
Immobile	43 (25.0%)	16	27
Needs help	62 (36.0%)	22	40
Independent	67 (39.0%)	10	57
Ability for basic self-care at the point of discharge			
Totally dependent	79 (45.9%)	31	48
Partially dependent	20 (11.6%)	5	15
Independent	73 (42.5%)	12	61
Requires skilled nursing at the point of discharge	28 (16.3%)	14	14
Urinary incontinence at the point of discharge	49 (28.5%)	18	31

AMT: abbreviated mental test

TABLE IV: PERIOD OF HOSPITALISATION ACCORDING TO OUTCOME OF DISCHARGE FROM ACUTE HOSPITAL

	Total	Delayed	Non-delayed
Number of patients	172	48 (27.9%)	124
Hospitalisation days	2427	1099	1328
Average length of stay (median)	11.0	19.5	8.5
Delayed days*	–	233.0†	–
Mean delayed days per delayed patient	–	4.9	–

* Delayed days: days attributable to delayed discharge

† 9.6% of total admission days for the study cohort, and 21.2% of admission days for the delayed group

TABLE V: VARIABLES ASSOCIATED WITH DELAYED DISCHARGE AFTER BIVARIATE ANALYSES

	P value
Decline in ability for self-care	< 0.001 ($\chi^2 = 12.89$)
Decline in ambulatory status	0.002 ($\chi^2 = 11.59$)
Requires skilled nursing at the time of discharge	0.004 ($\chi^2 = 8.11$)
Dependent in mobility at the time of discharge	0.004 ($\chi^2 = 8.17$)
Dependent in basic self-care at the time of discharge	0.007 ($\chi^2 = 7.33$)
Number of active medical problems	0.037 (t = 2.107)
Cognitive impairment	0.043 ($\chi^2 = 4.09$)

When the above variables were entered into a logistic regression model, the need for skilled nursing [$P < 0.001$; adjusted odd ratios (AOR), 4.57] and the decline in ability for basic self-care ($P = 0.011$; AOR, 3.63) were found to be significantly associated with increased risk of delayed discharge (Table VI). If the entry and removal levels for the factors were adjusted to 0.10 and 0.15, respectively, decline in mobility also came forth as a significant factor predicting delayed discharge ($P = 0.07$; AOR, 2.86).

Discussion

In this era of medical economics emphasising the judicious utilisation of limited health care resources, the magnitude of the problem highlighted by the findings of this study reaffirms the importance of reducing the incidence of delayed discharge from acute geriatric units. Each case of delayed discharge in the study stayed on the average an extra 5 days in the acute hospital. With the average cost of each acute geriatric bed in our hospital estimated to be around \$260 per day, this translates into a potential cost saving of approximately \$1300 per case if delayed discharge was prevented, and a total of more than \$60,000 for all the delayed cases during the 4-month study.

Various different methods have been utilised in the study of inappropriate hospital stay, or non-medical bed-days, of which delayed discharge is an important subset. Most of the studies were either retrospective,^{6,12,13} or adopted a management-centred approach, which involved review of

TABLE VI: FACTORS ASSOCIATED WITH DELAYED DISCHARGE DUE TO NON-MEDICAL CAUSES IN MULTIVARIATE ANALYSIS

Variable	Coefficient (B)	Standard error	P value	Adjusted odds ratio	95% CI
Intercept	-1.66	0.25	—	—	—
Required skilled nursing	1.52	0.45	<0.001*	4.57	1.88 to 11.14
Decline in basic ADL status	1.29	0.51	0.012*	3.63	1.33 to 9.86
Decline in mobility	1.05	0.59	0.075†	2.86	.90 to 9.07

* Logistic regression, forward stepwise selection, entry 0.05, removal 0.10

† Logistic regression, forward stepwise selection, entry 0.10, removal 0.15

patients' hospitalisation records to separate the period of stay into justifiable and non-justifiable bed-days according to specified criteria of the patients' clinical management.¹³⁻¹⁷ In the latter type of studies, whenever no active pre-defined treatment or diagnostic intervention took place during a hospitalisation day, that particular day would be classified as non-justifiable or inappropriate.

Our study, on the other hand, defined the appropriateness or otherwise of the hospital stay in relation to when the patient was clinically deemed fit for discharge. We had therefore adopted a strategy where the appropriateness or justification of a hospitalisation day was based solely on the patient's clinical status, and not on whether the management of the patient on that day satisfied a predetermined set of criteria. Our approach, in contrast to the management-centred method, allowed for the inclusion as "appropriate" those days when the hospitalised patient is only being observed to ensure a stable clinical recovery. Although such days were not marked out for this study, it is our impression that they generally constitute only a small percentage of the total hospital stay of our patients (especially when we have deemed the days when the patients were only receiving intensive rehabilitative therapy to be constitutive of active treatment). We are of the opinion that such an approach more accurately reflects actual clinical practice in acute geriatric care, and better identifies causes for delayed discharge amenable to practical interventions.

Our delayed discharge rate of 27.9% (n = 48) was comparable to studies done on patients admitted to general medical units.^{15,18} The percentage of hospitalisation days attributable to delayed discharge (9.6%) was, however, lower than other studies,^{6,8,13,14,17,19,20} especially those which had also focused on stroke patients, a group largely excluded from our work because such patients in our hospital are admitted directly to the neurology service. Most of the stroke patients have significant acute functional declines and tend to have prolonged hospital stay.^{6,16,17,21} A second factor may have been the exclusion of the 10 patients who died before their discharge status could be determined; they were functionally more dependent and, if not for their demise, would probably have contributed to a higher rate and magnitude of delayed discharge. Another factor to

consider would be the implementation of a multi-disciplinary discharge planning protocol in our study, often a routine practice in geriatric medicine units²² and which has been shown to shorten length of hospital stay,²³⁻²⁵ reduce delayed discharge,²⁵ and re-admission rate.^{23,26}

The results of the study demonstrate the central importance of functional deterioration in increasing the risk of delayed discharge in older patients after an acute hospital admission. Functional decline in the elderly after acute illness and hospitalisation is a well-documented finding.^{4,27,28} The function-related factors picked up by logistic regression's variable selection procedure were firstly, the need for skilled nursing and secondly, declines (from pre-admission to discharge) in basic activities of daily living and mobility.

The need for skilled nursing, such as clean intermittent catheterisation, wound dressing and tube feeding, was the strongest predictor of delayed discharge. This was reflected in the 10 cases who required extended hospitalisation (median of 5.0 days) in order for their informal caregivers to attain a reasonable level of competence and confidence through bedside caregiver training. In the 5 cases that required direct transfer from acute hospital to long-term care facilities, difficulties in coping with specialised nursing care were crucial in their respective families' decision to opt for immediate institutionalisation. This suggests the requirement for more community-based skilled nursing facilities and domiciliary nursing services⁶ when devising strategies to reduce delayed hospital discharge.

The next groups of statistically significant predictive factors were declines in ability for basic self-care (feeding, toileting, bathing, continence, transfer and dressing) and decline in mobility, reflecting once again the pre-eminence of functional issues amongst our Department's patients. Functional decline in the elderly hospitalised patients, in terms of their mobility and ability to perform basic ADL, poses practically the greatest amount of stress and burden on the caregivers. In our study, when faced with new and sudden increase in the amount of attention and care required by the patient, several of the caregivers often felt unprepared, and declared that they were not ready to bring the patients home. The actual reasons ranged from extra time needed for social and physical arrangements, to a subjective lack of confidence in managing elderly patients who had become

functionally more dependent after the acute illness. In some instances, the caregiver was simply unavailable or overwhelmed, resulting in institutionalisation of the patient and in 5 such patients, waiting for nursing home placement delayed discharge in each by almost 7 days.

Again, in relation to their functional decline, many of the patients in this study were referred to community hospitals for active rehabilitation and subacute medical care; but despite early and proactive processing of the transfer, delays still occurred due to bed shortages in the community hospitals, accounting for 97 hospitalisation days, a mean of 9.7 days per delayed patient ($n = 10$). Inadequate rehabilitative facilities and community services focused on care of the elderly was therefore a contributing factor to delayed discharge in our work, consistent with many previous studies.^{6,14,19,29,30} This factor becomes all the more important in the face of current socio-economic changes, such as diminishing family sizes,⁷ increased emancipation of females from their traditional roles as housewives and caregivers of the elderly,¹ and postponement of retirement age, that are resulting in increasing difficulties for family members to take over the post-acute care of functionally-impaired elderly patients.

In this study, we note the presence of several limitations. Firstly, we have assumed that all admissions are valid, while a study in Switzerland by Chopard et al,¹³ found that inappropriate hospital admission is an important source of inappropriate hospital days. We did not look at our admissions from this perspective but rather focused upon the functional changes induced by acute illness, and how these related to the patients' discharge date. Secondly, this being an unblinded prospective study meant that the geriatricians deciding on fitness for discharge might have modified their practice behaviour during the period of the study to achieve better results. The average length of stay for the study period, however, did not differ from our Department's annual figures, thereby suggesting the absence of any significant bias. The third limitation was the relative subjectivity in each geriatrician's decision on the date of fitness for discharge. The end point of "fitness for discharge" in our study rested not on a set of predefined criteria, but on the clinical judgement of the geriatrician-in-charge, potentially a source of significant variability. However, we feel that any such variability merely reflects the day-to-day reality of clinical practice, and should be incorporated or embraced in a study of delayed discharge. Furthermore, all the geriatrician-led teams in the study adopted generally similar approach in decision-making, based on established clinical guidelines and standard medical practices. It is noteworthy in this regard that comparison of the delayed discharge rates among the 5 clinical teams did not reveal any statistically significant

differences, indicating that the clinical judgement decisions of the different clinicians were not markedly at variance.

The findings of our study also highlight potential areas of intervention, one of which is to increase the number of intermediate-care facilities, a need similarly articulated in several published studies.^{6,17-19,31} In comparison to acute hospitals, community hospitals are generally less costly and less "hazardous", with much lower risk of iatrogenic problems faced in acute hospitals.³ They are well poised to serve the window period characterised by further (but slower-stream) functional recovery of frail older patients discharged from acute hospitals and the more adequate preparation of the caregivers for the eventual return of these patients to their homes.³²⁻³⁴ In this regard, another strategy would be the development of domiciliary care services or community-based nursing services. Existing data have shown that such programmes can help reduce incidence of prolonged hospital stay,^{35,36} and institutionalisation,³⁷ while improving functional outcomes.^{35,36,38}

With the above services in place, the final step required is a system that allows punctual and timely transfer of the right category of patients from the hospital to the community, thereby preventing fragmentation of care.³⁹ To implement such transfers, standardised discharge planning protocols aimed at early functional evaluation of all elderly patients, regardless of the specialty service they are admitted to, become important. Our findings lead us to propose that an effective discharge planning protocol must assign adequate attention, by means of a multidisciplinary team, to the evaluation of functional status and problems that may predispose the patients to the need for skilled nursing care. This should then identify a group of "at risk" patients for the implementation of early rehabilitation and caregiver education. In fact, this study has also functioned as an audit for us in that our Department too has the potential to tighten up further in terms of effecting even earlier caregiver training and rehabilitation referrals.

Conclusion

This study indicates that to effectively reduce the incidence and severity of delayed discharge amongst hospitalised elderly patients, several strategies need to be concurrently in place. Early and effective identification of at risk inpatients (by means of a multidisciplinary focus on their illness-induced functional declines) must be followed by proactive approaches to rehabilitation and caregiver training and likewise, adequate community-based services will further support early and effective return of these patients to their homes. Ultimately, the aim is to reduce the inappropriate use of acute beds for non-acute needs of older patients, while maintaining good quality geriatric care. Functional issues may not be immediately life-threatening. Managing

them effectively is, however, a pivotal element in optimising the quality of life for the frail elderly patient and their caregivers. If inadequately addressed, the same functional dimension leads to unnecessary and wasteful re-hospitalisation and/or institutionalisation.

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