

# Description of an early discharge post-acute care program: length of hospital stay, patient and carer needs and cost

BILLIE BONEVSKI, CHRIS DORAN, CAROLYN BAILEY,  
AND JULIA LOWE

Billie Bonevski is Senior Research Officer at the Newcastle Institute of Public Health. Chris Doran is a Health Economist at the National Drug and Alcohol Research Centre, University of New South Wales. Carolyn Bailey is Post Acute Care Coordinator at the Newcastle East Community Health Centre. Julia Lowe is Director of Medicine at John Hunter Hospital and Chair of the Newcastle Institute of Public Health.

## Abstract

*The objective of the project was to evaluate a pilot Post Acute Community Care (PACC) program for orthopaedic patients. A series of cross-sectional surveys elicited responses of patient and home carer needs and GP and hospital staff acceptability while a cost-minimisation analysis compared the average cost of the PACC program with general orthopaedic hospital care. Patients were classified according to Australian National Diagnosis Related Groups (DRGs). Average length of hospital stay in 1998/99 for PACC patients was 7.7 days compared to 12.3 for general orthopaedic patients. Only 3% of patients had an unplanned readmission to hospital. Patients and carers expressed a number of unmet needs. This study confirms the popularity of early discharge schemes with patients, and provides little evidence of adverse health outcomes or that the burden of care is shifted to carers in a way that is unacceptable for this older population.*

## Evaluations of hospital at home programs

Average lengths of hospital stay have been creeping down in most Western countries. One initiative that has contributed to the decrease is the early discharge of patients and provision of equivalent health care in the home. A recently published report aimed at examining issues relating to progressing hospital in the home programs in Australia acknowledged the difficulty with defining such programs (Haas 1999). Essentially they are substitute low level care provision for what would otherwise be acute hospital care. It is assumed that such programs offer many benefits (Clarke 1997). It is important, however, that health service initiatives are carefully evaluated to ensure that the benefits are real.

Two rigorous systematic reviews of randomised controlled trials of the effectiveness of hospital at home have suggested that it may be beneficial for patients with some conditions (e.g., rehabilitation, stroke and care for older patients) but is less convincing for others (e.g., intravenous therapy, deep venous thrombosis, obstetrics, surgical, palliative care and psychiatry) (Haas 1999; Clarke 1997).

Few well-designed economic studies of hospital at home exist. A review of those that do draws no firm conclusions (Haas 1999). In fact, much of the Australian evidence so far suggests that hospital in the home

could result in increased costs (Beech 1999). Importantly, the review highlights the context-specific nature of hospital at home costs. In this paper, costs of hospital at home are coupled with clinical and psychosocial outcomes in an evaluation of an Australian hospital in the home program.

## **Methods**

### **Study design**

Two methods were employed. Cross-sectional surveys with patient and home carers measured their needs and assessed the acceptability of the program to hospital staff and general practitioners. A cost-minimisation analysis of the PACC care compared to general orthopaedic hospital care was conducted using retrospective data from a number of sources. The project was approved by the Hunter Area Health Service Human Research Ethics Committee.

### **Setting**

The Post Acute Community Care (PACC) program in the Hunter Area Health Service (HAHS) aims to provide hospital-type care in the home environment. The program was established in June 1997. The total number of patients that have used PACC to 31 March 2000 is 2151. The service is offered seven days a week, with a nurse on call after hours. Mostly elective, orthopaedic surgery patients and uncomplicated deep venous thrombosis patients are referred to PACC. Occasions of service were 2685 in 1997/98, 3988 in 1998/99, and 3642 from July 1999 to 31 March 2000.

### **Cross-sectional study**

Between May and December 1999, consecutive patients were recruited. On the day of their final PACC contact, patients were provided with a questionnaire for themselves, a questionnaire for their carer, and information and consent sheets by PACC staff (see below for descriptions of questionnaires). Patients were asked to read the information sheet, complete the consent form and post it back with the completed questionnaire within seven days. Those patients not responding were sent a second mail-out. If no response was made following the second mail-out, non-consent was assumed.

Hospital staff involved with the PACC program were given information sheets, consent forms and a questionnaire during their shift at the hospital. They were asked to complete the questionnaire at home and post it back completed within seven days. GPs identified as PACC patient providers by the PACC program were mailed information and consent forms and a questionnaire to return when completed. In both cases non-consent was assumed when a second follow-up survey was not returned.

### **Patient and carer needs questionnaire**

An adapted version of a survey of the health-related needs of oncology patients was used as a basis for the survey instrument (Bonevski et al. 2000). The final survey asked patients/carers what their service, resource, staff and other psychosocial needs were whilst receiving care under PACC. Subjects responded by indicating whether the need item was 'not applicable', 'had been satisfied by the service', is a 'low need', 'moderate need' or 'high need'. Carer surveys also contained items relating to costs they may have incurred.

### **Health care provider questionnaire**

The surveys provided to GPs and hospital staff assess level of satisfaction with the program, patient involvement, acceptability, and (in the case of GPs only) awareness of PACC. The development of the surveys was based on already existing instruments routinely used by the PACC service as quality assurance tools.

### **Clinical outcomes**

Routinely collected data on adverse outcomes was extracted from the PACC database. As there were only a few events, clinical outcome data from January 1999 to March 2000 (including the period of the cross-sectional study) was analysed.

## Cost-minimisation study

A cost-minimisation analysis was considered the most appropriate method of economic evaluation given that the outcomes or consequences (in terms of health improvement) of both PACC care and hospital care are equivalent. Although the extent of health improvement is subject to variation, from an economic viewpoint the main question surrounds the variations in resources and hence costs of the competing modes of service delivery. This cost-minimisation study was conducted from the perspective of the health care treatment provider.

## Data extraction

Data for the cost-minimisation study was extracted from two sources: hospital costing records and financial data from the post-acute care program PACC records for the years 1997/98 and 1998/99.

The HAHS provided hospital inpatient records for the financial years 1997/98 and 1998/99 for the John Hunter Hospital and Royal Newcastle Hospital. These records identified all general orthopaedic inpatients (including PACC patients) by year and hospital. In total eight files were provided that disaggregated individual records according to medical record number (MRN), sex, age, length of hospital stay (LOS), DRG, International Classification of Diseases (ICD) codes and total cost of an episode for each patient. The total cost groups that hospitals are required to identify include clinical department, operating theatre, imaging, emergency department, ward, intensive care, drugs, allied health, prosthesis and depreciation.

Community Health and Nursing provided the PACC database containing information on PACC outpatient episodes of care. The database provided disaggregated individual records according to MRN, age, length of stay as a PACC outpatient (including admission and discharge dates), time spent by nursing staff, time spent by physiotherapist and time spent by occupational therapist. Detailed information on total employee costs, expenditure on goods and services and repair, maintenance and replacement were also provided. Salary rates for PACC program staff were provided for 1998/99 only.

## Data analysis

Medical record numbers were used to link patient data from the hospital records with the PACC data. Date of discharge from the PACC program was used as the identifying variable for the relevant financial years. This resulted in a total of 712 PACC patient episodes being identified (from 1,386 records), 268 for the 1997/98 year and 444 for 1998/99. Patients were then classified according to the appropriate DRG which provides a description of the main procedure the patient receives while in hospital.

The majority of patients were grouped into five main categories: 405 total hip replacement without complication; 406 other joint reattachment with complication; 407 other joint reattachment without complication; 468 aftercare muscular/connective tissue with complication; and 469 aftercare muscular/connective tissue without complication. Given that these categories covered the majority of patients, only these five DRG classifications are included in the analyses. The "Other DRG" category, although discussed, is not considered in detail in the results section. It is important to note that only those hospital DRG classifications that matched PACC records of DRG classifications of inpatient care were included. This resulted in 4,337 patient hospital records in 1997/98 and 4,427 records in 1998/99.

Total and average cost of inpatient care by DRG were extractable from hospital records. Using data extracted from PACC financial accounts, the cost of nursing and physiotherapist time was calculated by combining the amount of staff time spent with PACC patients with actual salaries of each staff member. Direct staff costs were then subtracted from actual PACC expenditures to avoid double counting. The combination of staff costs with other financial operating costs was then adjusted pro rata using the numbers of clients on the PACC program for the relevant financial years. Using this method, running costs were estimated to be \$517.81 per patient in 1997/98 and \$620.67 per patient in 1998/99.

Using average cost per patient data obtained by the previous calculation, hospital inpatient costs by DRG were combined with PACC patient care data to estimate the average cost of a patient while on the PACC program (ie, both inpatient and outpatient care). These estimates were compared to the average cost of a general orthopaedic hospital inpatient according to DRG classification for the cost-minimisation analysis.

## Results

### Patient outcomes

Between January 1999 and the end of March 2000, 731 patients were registered with the program. Of these, 1.5% reported a fall, 0.9% suffered a deep vein thrombosis and 0.7% an infection. Three percent and 7.7% respectively had an unplanned readmission to hospital or unplanned clinic visit after discharge from inpatient care. Most patients were female (53%), aged between 56 and 85 years (86%), were married (73%), retired (61%), and lived in a house or flat (90%) with at least one other person (88%). The types of procedures patients reported entering hospital for included knee replacement (32%), hip replacement (23%), broken bones (22%), other (21%) and 2% did not know.

Consent to participate in the cross-sectional surveys was given by 103 (77%) patients, 81 (92%) home carers, 28 (61%) hospital staff and 29 (45%) GPs. While the majority of patients (82%) reported that they believed they were sent home at the right time, 11% believed that they were sent home too early.

The ten most prevalent needs perceived by patients are shown in Table 1. Most patients (62%) reported to need help with pain, followed by needing help with not being able to do the things they used to do (60%) and help with walking (57%).

**Table 1: the ten most prevalent needs reported by PACC patients**

What was your level of need for help with:	% reporting a need			Total
	Low	Moderate	High	
Pain	19	19	24	62
Not being able to do the things you used to do	9	13	38	60
Walking	24	12	21	57
Changes to usual routine and lifestyle	17	17	22	56
Dressing your lower body	22	12	15	49
Climbing stairs	15	7	27	49
Concerns about the worries of those close to you	22	9	17	48
Concerns about the ability of those close to you to cope with caring for you	16	11	20	47
Taking care of the housekeeping	6	6	33	45
Gardening	0	6	39	45

### Carer outcomes

Most home carers were female (62%), aged between 46 and 75 years (80%), married or living with someone (80%) and retired (62%). Seventy five percent of carers indicated they normally live with the patient.

Although 68% of carers were happy with the time the patient was discharged, 22% felt that the patient was being discharged prematurely. Twenty-seven percent of carers indicated they were not at all concerned about the

time that the friend or family member went home, but 37% were a little concerned, 19% somewhat concerned and 17% very concerned. Six percent of carers said they took time away from work (average 82 hours) to care for their friend/relative and only one percent needed to make child care arrangements. The majority of patients (91%) reported that there were no other costs associated with caring. Buying medications for the patient was nominated as the main expense by those who declared other costs (90%), followed by preparing/buying meals (10%). The average cost of these categories was \$61.

PACC patient home carers most frequently reported needing help with changes to their usual routine and lifestyle (51%) and 20% reported this as a high level of need. Table 2 shows the 10 most prevalent needs expressed by home carers.

**Table 2: the ten most prevalent needs reported by home carers of PACC patients**

What was your level of need for help with:	% reporting a need			
	Low	Moderate	High	Total
Changes to usual routine and lifestyle	29	2	20	51
Feeling tired/fatigued	18	5	23	46
Helping your friend/relative do things they used to do	18	3	18	39
Fears about your friend/relative's physical disability or deterioration	21	5	10	36
Feeling frustrated about how much you can't do	21	3	10	34
Not sleeping well	23	5	5	33
Anxiety	13	0	20	33
Taking care of the housekeeping	10	7	14	31
To be given information (written, diagrams) about aspects of managing your friend/relative's illness at home	18	5	8	31
Hospital staff to convey a sense of hope to you and your relative	21	5	3	29

### Hospital staff awareness of and satisfaction with PACC

The average age of the 28 hospital staff members who completed the survey was 35 years (range 23 to 57 years). Eighty five percent were female. The majority (33%) were registered nurses (n = 9). Occupational therapists (5), physiotherapists (6), social workers (3), 'trainee enrolled' (1), 'allied health' (1) and a doctor (1) made up the remainder of those who answered the survey. Two staff members did not specify their profession.

Awareness of the PACC service amongst hospital staff is very high (96%). When asked to describe in their own words what they believed the PACC service does, most respondents said they thought it was an "early discharge" service providing care in the patient's home or the provision of "multidisciplinary care to patients to allow early discharge". Other descriptions included "assists patient health problems", "assists patients in being self-sufficient in their own home or environment by providing equipment and follow-up care", and "short term assistance to patients on discharge". Sixty two per cent (n = 17) of respondents reported having received an inservice training program on the PACC program.

Staff satisfaction with PACC services was generally high. Most staff (88%) said they had no difficulty referring patients to PACC, but two people (8%) did not know whom to contact. Two thirds believed that both patients and the hospital always benefited from the program and 77% found the team response to referral of a patient both prompt and helpful.

## GP awareness of and satisfaction with PACC

The majority of responding GPs (Total N = 29) were male (88%) with an average age of 49 years (range: 34-73 years). Most GPs (84%) said they had been practising as a GP for more than 10 years, with 60% reporting that they had worked at their current practice for more than 10 years.

Seventy one percent (n = 21) of GPs said they were aware of the service provided by the PACC team and most of these reported having had patients who received PACC care (76%) with 68% reporting to have up to five PACC patients. Home visits by the GP were involved for 78% of those patients. GPs indicated that 57% of home visits were initiated by the patient, 24% by the PACC team, 14% by the patient's home carer and 5% by the GP.

Although 83% of surveyed GPs were satisfied with PACC patient care, only 54% were very or somewhat satisfied with PACC's method of notification. Seventeen percent were not at all satisfied with notification regarding their patients. Ninety two percent of GPs felt that the PACC service benefited all or some patients.

## Cost analysis

Although not formally presented in a table, the results of the analysis suggest that when the main DRG categories are combined, the average cost per inpatient is less for PACC inpatients (\$10,056) than it is for general orthopaedic inpatients (\$10,416). However, the reverse is true when comparing "Other DRGs" across PACC inpatients (\$8,527) and general orthopaedic inpatients (\$4,259). A similar pattern exists for the ALOS with PACC inpatients enjoying a shorter stay for the main top five DRGs combined (7.7 days vs 12.3 days) but longer for "Other DRGs" (11.5 days vs 5.5 days) and "Total DRGs" (10.3 days vs 6.7 days) when compared to general orthopaedic inpatients. These variations can be explained in part by the age differences between PACC patients and general orthopaedic inpatients. For the main DRG categories, the PACC patients are the same age as the general orthopaedic inpatients (71 years of age). However, the age difference in the "Other DRGs" is substantially wider with PACC patients, on average, 10 years older than general orthopaedic patients (65.6 years vs 55.6 years). This difference subsequently filters into the "Total DRGs" average.

Using the methodology described earlier, Table 3 provides an estimate of the the total cost and average costs of the PACC program (both direct staff and operating costs) for each DRG and an average of the main DRGs for 1998/99. DRG 405 is the most expensive category at a total cost of \$44,858. DRG 469 is the least expensive with a total cost of \$20,275. However when total costs are allocated according to number of patients in each category, average costs are very similar across all DRG categories at around \$724 per patient.

**Table 3: total and average cost of PACC program (1998/99)**

DRG	Direct Staff cost (\$)	Operating costs (\$)	Total PACC program costs (\$)	Cost per patient (\$)
405	6,376	38,482	44,858	723.5
407	5,036	34,758	39,794	710.6
406	5,349	29,172	34,521	734.5
468	3,793	21,724	25,516	729.0
469	2,896	17,379	20,275	724.1
Average of 5 DRGs	4,690	28,303	32,993	724.4

Costs of the PACC service compared to general orthopedic inpatient services

Table 4 compares the average cost of hospital inpatient care for general orthopaedic patients with the average cost of PACC care (including inpatient care plus PACC program outpatient care, from Table 3) for the main DRG categories for the year 1998/99. The results suggest that PACC care is marginally more expensive than general orthopaedic inpatient care for all of the main DRGs with the exception of DRG 468 where savings are achieved with PACC care.

**Table 4: average cost of PACC care compared to hospital care (1998/99)**

DRG	PACC care (\$)	Average cost per patient	
		Hospital care (\$)	Difference (\$)
405	13,520	11,932	1,588
407	13,160	12,514	647
406	14,921	14,383	538
468	7,699	9,380	(1,681)
469	4,600	3,873	728
Average of 5 DRGs	10,780	10,416	364

## Discussion

This review of the everyday outcomes and costs of running an orthopaedic hospital in the home program goes some way to addressing the concerns often raised by doctors about these programs. Clinical care appears to be equivalent, with no increase in adverse outcomes. Length of hospital stay (LOS) results obtained in the current evaluation compare favourably to NSW trends (Horder 1999). While patients and carers expressed some unmet needs and concerns, overall the program was acceptable to them. Despite the initial misgivings of local general practitioners, their only major concern once the program was running was with the way in which they were notified that a patient had been discharged after surgery to the PACC program.

## Limitations of the study

Conclusions regarding the results of the study must be made in light of a number of methodological limitations. Foremost, the evaluation did not employ a randomised-controlled design due to a lack of resources, and a service agreement that ensured that all eligible patients received the PACC program – thus precluding randomisation. However, the study provides valuable information regarding the process of receiving PACC care, its costs in comparison to usual hospital care and the experiences of patients, their carers and health care providers.

The survey sample sizes were small (patient N= 103, carer N=81, hospital staff N= 28, and GP N= 29). The total number of patients that have received PACC care since its inception is 2,151. Thus, the patient sample in this study represented 5% of all patients who received care at the HAHS PACC service. With the exception of GPs (with a response rate of 45%), the response rates for each survey were relatively high (patients 77%, carers 92%, hospital staff 61%) which suggests that the results of this study are generalisable to the wider post-acute service population.

A number of problems were associated with the economic data used in the cost-minimisation study. Data was retrieved from two different sources, the PACC service records and hospital records. A lack of consistency between data sources hampered the analyses and resulted in a number of modifications. A standardised approach to recording and reporting this data would significantly improve the quality of data analysed. Because the data was received from more than one source and then combined, it was not possible to perform statistical tests to examine differences in costs between the two types of care.

Another limitation of the costing exercise is the decision to include only five DRG categories. Although the five main DRGs captured the majority of patients, had the analysis included patients in the “Other DRG” categories the results may have been somewhat different. As discussed previously, there existed a 10 year age differential between PACC patients and general orthopaedic patients in the “Other DRG” category. This does suggest that the populations are distinctly different and although it may be appropriate to exclude them from the current analysis, it may have been informative to consider the resource implications associated with this patient group, especially if these patients had more complications or encountered more difficulty in transferring to a home

setting. Conversely, these PACC patients may have similar issues to those of patients of the same age in the general orthopaedic category.

Therefore the results of the current costing exercise may only be viewed as tentative findings. A more detailed cost analysis with accurate data would provide more conclusive results regarding the costs of the PACC program. Despite these limitations, the study provides important information about the costs of the PACC service and the experiences of those associated with the program. Economic evaluations of similar programs, including those conducted as part of randomised controlled trials, have produced conflicting results (Jones 1999; Farnworth 1994; Hollingworth 1993; Shepperd 1998; Richards 1998; Coast 1998; Coast 2000). Anticipated cost savings are not always achieved because of failure to reduce inpatients bed numbers. The results of this and other studies are consistent with hospital at home schemes delivering care at similar costs to that of hospital care. Strategies to address many of the methodological difficulties encountered in this and similar economic evaluations have been discussed by Coast (2000).

### **Concerns about premature discharge**

Fewer carers (69%) than patients (82%) felt that the timing of patient discharge was appropriate and more carers were very or somewhat concerned (36%) than patients (17%) about patients going home. This is not surprising; there is ample evidence in the literature that patients prefer to go home as soon as possible (Caplan et al. 1998; Adler 1978). Carers on the other hand need to feel confident in their ability to care for the patient in their home. Anxiety and fear, which were areas they reported to need help with in this study, coupled with fatigue and changes to their routine, may heighten their concern regarding discharge. Some evidence suggests that carer support and information services may assist them to feel more comfortable with their friend or relative being sent home (Caplan et al. 1998; Adler 1978).

### **Perceived needs**

The needs expressed by patients and carers are those commonly reported in the literature, such as needing help with pain, not being able to do the things they used to do, walking and changes to their usual routine (Caplan et al. 1988; Goodman 1997; Pound 1999). The most common needs reported by patients in this study were for practical assistance, for example with gardening. The provision of support services may allay some anxiety about going home. One recent study with stroke patients discharged early found that the more therapy, meals on wheels and home visits patients received, the more likely they were to be satisfied with their post acute care (Pound 1997).

Carers reported the need for help with issues that may have resulted from taking on the role of carer: changes to usual routine, tiredness and fatigue, fear and frustration, trouble with sleeping and anxiety. A carer support component within the PACC service may assist with these issues. Early discharge and hospital at home programs have been accused of being responsible for an element of 'shifting the burden' of caring for patients from hospital into the community (Adler 1978; Russell 1977). Our results may reflect this shift, given carers seemed to report feeling a burden in caring for these patients. However, the results of the current study do not support arguments of additional costs as a result of caring for their friend or relative.

This study confirms the popularity of early discharge schemes with patients, and provides little evidence that the burden of care is shifted to carers in a way that is unacceptable for this older population. Despite methodological limitations, the data are not consistent with large cost savings being obtainable by such programs. This study highlights the need for hospital in the home programs to be carefully targeted at specific populations and evaluated fully.

## **Acknowledgements**

We are greatly indebted to the Post Acute Community Care team for their collaboration. Thanks also to Mr Tony Maher for valuable and constant feedback. The project was funded by the Hunter Area Health Service.



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