MEDICAL INPATIENT STUDY REPORT

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Clinical Epidemiology and Health Service Evaluation Unit

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List of Abbreviations

ACAS	-	Aged Care Assessment Service
AH	-	Allied Health
ALOS	-	Average length of stay
ARMC	-	Austin & Repatriation Medical Centre
BI	-	Barthel Index
CCF	-	Congestive Cardiac Failure
CI	-	Confidence Interval
COPD	-	Chronic Obstructive Pulmonary Disease
CPG	-	Clinical Practice Guidelines
DOS	-	Duration of stay
DRG	-	Diagnosis Related Groups
DUSOI	-	Duke Severity of Illness scale
ED	-	Emergency Department
ELOS	-	Expected length of stay
FTE	-	Full Time Equivalent (staffing)
GEM	-	Geriatric Evaluation and Management
GMU	-	General Medical Unit
HACC	-	Home and Community Care
HITH	-	Hospital in the Home
HMO	-	Hospital Medical Officer
IPA	-	Individual Patient Attributable time
IRSED	-	Index of Relative Socio-Economic Disadvantage
LGA	-	Local Government Area
LOS	-	Length of Stay
MAPU	-	Medical Assessment and Planning Unit
MECRS	-	Melbourne Extended Care and Rehabilitation Service
MMC	-	Monash Medical Centre
MMSE	-	Mini-mental State Examination
NUT	-	Nutrition
NZHTA	-	New Zealand Health Technology Assessment
OR	-	Odds Ratio
OT	-	Occupational Therapy
PAC	-	Post Acute Care
PGMU	-	Professorial General Medical Unit
PT	-	Physiotherapy
RMH	-	Royal Melbourne Hospital
RNSH	-	Royal North Shore Hospital
SD	-	Standard Deviation
Seps	-	Separations
SLA	-	Statistical Local Area
SMU	-	Specialist Medical Unit
SOU	-	Short stay Observation Unit
SP	-	Speech Pathology
SVH	-	St Vincent's Hospital
SW	-	Social Work
UA	-	Unstable Angina
VAED	-	Victorian Admitted Episode Dataset
VAS	-	Visual Analogue Scale
VIMD	-	Victorian Inpatient Minimum Dataset (replaced by VAED)

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Disclaimer

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The results and conclusions are those of the authors and no official endorsement by the Department of Human Services was intended or should be inferred.

1. Executive Summary

Introduction

Our ageing population impacts upon acute hospital resources by changing the demand for acute medical admissions and for subacute and aged residential care beds. Acute hospitals are struggling to balance demands for access with current resources. They are seeking to further improve quality of care and clinical outcomes through implementing initiatives such as clinical practice guidelines and concurrently to maximise efficiency. The increased number of patients with complex medical conditions including geriatric co-morbidities also raises issues about the balance needed between specialisation and general medicine.

Many elderly patients present complex medical, social and psychiatric challenges. They may suffer with 'geriatric syndromes' such as depression, cognitive impairment, poor mobility, falls and incontinence and experience functional decline during hospitalisation. This may contribute to longer lengths of stay (LOS), increased risk of complications, iatrogenic events, impairment of physical performance and additional need for sub-acute and/or residential care. Appropriate geriatric care in acute hospitals may limit functional decline and lead to earlier transfers to home or for rehabilitation.

There is a need to describe the complexities of medical patients and requirements for care. This includes processes for effective and timely discharge, which may have implications for staff training and bed allocation. When considering the situation in Victoria, it is important to get an accurate picture of the issues and the extent to which a problem exists, before identifying potential solutions. It is important to focus on best possible patient outcomes and to examine the potential for improvements in systems of care. The challenge is to adequately describe medical in-patients, including factors effecting LOS such as psychosocial determinants, and examine the work undertaken by Specialist (SMU) and General Medical Units (GMU) to identify opportunities for improving performance within the acute sector.

This project examines features of management of medical patients admitted to The Alfred, Austin and Repatriation Medical Centre (ARMC), Monash Medical Centre (MMC), Royal Melbourne Hospital (RMH) and St. Vincent's Hospital (SVH), the five largest teaching hospitals in Melbourne. The study focuses on examining hospital performance for patients admitted under the care of GMUs. The project was conducted between June and November 2000.

Aims

The aims of this study were:

- To describe the range, type and organisation of services provided at five teaching hospitals for the care of "medical" (i.e. non-surgical) in-patients in both GMU and SMU.
- To identify and examine the factors responsible for variations in LOS for medical in-patients between and within hospitals.
- To describe the characteristics of patients and the care that they receive during medical in-patient episodes of care.

Study Design

Three separate studies were undertaken.

- The first study used qualitative and quantitative methods. Interviews with senior executive and clinical staff identified hospital management structures and clinical support frameworks for medical in-patients. A limited consumer perspective of medical in-patients was gained through the use of patient and carer focus groups from two hospitals. Extensive analyses of the 1999/2000

Victorian Admitted Episode Database (VAED) supplied by each hospital and based on the inclusion of the managing clinical service, were undertaken to develop a description of patient characteristics and conditions managed by GMUs and SMUs. Data collected routinely by the Commonwealth government were analysed to develop descriptions of the characteristics of catchment areas for each hospital. These analyses based on local government (LGA) or statistical local areas (SLA) included demographic features, nursing home bed availability and indices of relative socio-economic disadvantage and informal carer availability.

- The second study involved a one-day census of medical in-patients in the five hospitals. An extensive set of data variables was collected for each patient. These data were analysed to enable hospital comparisons on activity and performance.

- The third study used a cohort design to examine the day-by-day care provided for patients admitted with three specific diagnoses, chronic obstructive pulmonary disease, congestive cardiac failure and unstable angina. This was undertaken in order to more closely examine the relationship between processes of care and outcomes, whether admitted under the care of GMU or SMU.

Key Findings

Organisational structures

All hospitals have decentralised organisational structures whereby core activities are divided into sections. Each clinical section in the five hospitals had both medical and nursing senior clinical staff at the top management level. The reporting and communication relationships which include reports on clinical outcomes, were in place to varying degrees. Few hospitals had structures and supporting systems which ensured that the clinical and organisational goals were aligned. No particular structure or set of internal relationships appeared to better support general or specialist medicine.

Observations on general medical units

Our observations from across the five hospitals indicated that in GMUs:

- the resident medical officers were more junior and their rostered terms shorter than in SMUs;
- senior medical staffing was more fragmented, with no fulltime appointments in any of the hospitals for GMUs, in contrast to SMUs;
- nursing staff in GMU wards had more graduate level nurses and made greater use of non-permanent staff than in corresponding SMU wards;
- allied health staff were more junior and turnover more frequently;
- service and quality improvement activities for patient management was variable, uncoordinated and frequently not aligned to organisational goals;
- professional development of senior medical staff was usually left to individual responsibility and was unrelated to strategic organisational goals and
- no formal training in management was provided for clinical leaders from any of the health professions.

Occupancy rates

The occupancy rate (>99%) in the five hospitals was extremely high. Over 95% of all GMU in-patients were admitted as emergency admissions. There was some variability in the extent of emergency admission between SMUs from both the VAED and census findings. At each hospital, there were different emergency department (ED) admission policies, but this seemed to have minimal impact on admission practices and on the characteristics of patients admitted to GMUs at the different hospitals. From the census data, most GMU patients were admitted directly from home (77%) with a reasonably high proportion (13%) from hostels and relatively few patients (4%) from nursing homes.

Demographics

Catchment areas for each hospital were defined on the basis of SLAs providing greater than 5% of total hospital separations. The level of relative socio-economic disadvantage and the availability of community support within catchment areas differed between hospitals. Both are considered to have the potential to impact adversely on the ability to transfer or discharge patients to a community setting in a timely way. Both RMH and SVH had catchment areas with lower socio-economic status and higher proportions born overseas. The availability of aged residential care (both high and low) was lowest for RMH.

Carer index

A further support measure, the informal carer index (ratio of people aged 45 – 60 years to people aged 80 years or more), which provides an indication of potential support availability for convalescence and continuing care at home, was developed for each hospital's catchment area. When compared to a similar index from the USA, the indices were generally low for most hospitals and were likely to decline over the next 15 years.

Residential aged care issues

The current availability of aged residential places seems to be grossly inadequate. From information provided subsequent to the management interviews at each hospital, there was a weekly average of 23 medical in-patients (ranging from 13 – 32) remaining in each hospital awaiting aged residential placement in the previous 12 months. This represented approximately 36,500 bed-days and 2.6% of medical in-patients in a full year across these hospitals.

Proportion of medical in-patients in general medical beds

From the examination of the 1999/2000 VAED, our study showed that medical in-patients (i.e. non-surgical admissions) generally accounted for between 40% and 50% of multi-day stay in-patient episodes at these hospitals. General medical units managed 27% of medical patients. In three hospitals, (ARMC, RMH and SVH), the proportion of multi-day medical in-patient separations cared for by GMU was remarkably similar (32%, 34% and 35% respectively), whereas at MMC and The Alfred the proportion was much lower (16% and 14% respectively).

General medical patients are older, have more co-morbidities, more cognitive impairment and other social factors

General medical unit patients were older (average age over 70 years), had more co-morbid diseases, and frequently had cognitive and other social factors, which were likely to affect discharge planning, particularly the likely destination at discharge and expected length of stay (LOS). Although the range of conditions managed by GMUs was extremely diverse, a large proportion of primary diagnoses were accounted for by conditions affecting the respiratory and cardiovascular systems.

Length of Stay

The average LOS is commonly used in Victoria as a broad gauge of hospital performance. From both the VAED and census analyses, it was apparent that this might be misleading. Both datasets demonstrated a skewed distribution of LOS with a small proportion of patients with long lengths of hospital stay. This was best illustrated from the VAED by reviewing the use of bed-days for those medical in-patients who were in hospital for more than 13 days in 1999/2000. **Whilst this long-stay subgroup represented less than 13% of total separations for multi-day stay medical in-patients in 1999/2000, they consumed over 48% of bed-days occupied by medical in-patients and had an overall average LOS of 27.4 days**.

9 DRGs account for at least 40% of the general medical workload

As there is no better indicator readily available however, the data were analysed by average LOS. When all multi-day medical separations, irrespective of hospital or condition, were analysed for average LOS by unit, GMU separations had a longer average LOS (8.5 days ± 10.3) than SMU separations (6.7 days ± 9.9). Further analyses of the data were undertaken on the nine most common diagnosis related groups (DRGs) for GMUs. These DRGs accounted for at least 40% of the GMU workload in each of the 5 hospitals. For these DRGs, LOS was compared with those from corresponding SMUs at each hospital and between GMUs for each hospital.

When all co-variates are considered, General and Specialist Medical units have similar LOS for the same clinical conditions

There were minimal differences in LOS between GMU and SMU for respiratory infections, COPD, CCF, dementia and stroke. The only significant difference was in the management of unstable angina where SMU patients left hospital in a shorter time. Other co-variates, (age, gender, co-morbidities and discharge destination) which are considered to have the potential for increasing LOS, were included in further LOS analyses. When the outcome was adjusted for these factors, the GMUs at The Alfred and ARMC discharged patients slightly earlier than the corresponding SMUs. For MMC, the rate was almost the same for both subgroups and at RMH and SVH the difference between the average expected LOS narrowed between SMU and GMU, although SMUs discharged patients in a slightly shorter time.

Average LOS in general medicine varied across hospitals

When the highest volume DRGs for GMUs were compared, important differences emerged. Firstly there was a large degree of variability between hospitals on average LOS, however there was also a very wide distribution in LOS. There were a small but influential number of separations with very long stays in hospital. These separations utilised a disproportionately large percentage of the available bed-days. Analyses of high outlier patients remaining in hospital for greater than the hospital average LOS plus two standard deviations demonstrated that 7% of patients of The Alfred were in this group, whereas the other hospitals had 5% or less.

A large majority of patients go directly home from hospital

The second key point of difference was in the area of discharge. The type of location to which patients were discharged varied greatly between hospitals. Whilst home was the most common destination, the next most common destination was a category entitled “other hospital” and then “nursing home” which covers both nursing home and hostel placement. In comparing activity by the common high volume DRGs across the GMUs, no hospital consistently outperformed others. Better performance on average LOS was seen in the management of respiratory conditions at The Alfred, in unstable angina at MMC and in stroke at SVH.

Discharge destination is an important influence on length of stay

The discharge destination has a very significant influence on LOS. The proportion of patients discharged home was approximately 83% for all multi-day medical patients and 74% for GMU patients. The average LOS for this group was 6.1 days. There was variability between hospitals in both proportions of patients discharged home and average LOS for these patients.

Discharge to other hospitals

The proportion of patients accounted for in the “other hospital” destination was 7.4% with an average LOS of 12.3 days. The extent to which patients were discharged to “other hospital” varied greatly between hospitals with The Alfred generally sending the highest proportions of patients to this destination. For this destination, there was variability between hospitals for both GMU and SMU when comparing average LOS.

Discharge to residential aged care

The proportion of patients discharged to a nursing home placement was much higher from GMUs than SMUs. All discharges represented only 1.7% of separations and the average LOS was 15.5 days. There was variability in LOS between hospitals. It was interesting to note that the proportion of patients being discharged to a nursing home was least at RMH, which may be a reflection of the lower availability of beds in the surrounding catchment area.

Thirteen percent of patients utilise almost half the available medical bed days

A separate analysis of the impact of discharge destination upon LOS was undertaken for the long stay subset of patients (LOS $\geq$ 14 days). Overall this long stay group accounted for 12.6% of multi-day stay medical in-patients. They had an average LOS of 27.4 days and utilised 48.3% of total bed days. The proportion of long stay patients in GMU was higher, but the average LOS in SMU was greater. Variability in both the proportions of separations and average LOS was evident between hospitals for both SMU and GMU.

Almost two thirds of long stay patients go home

The proportion of long stay patients discharged home was 59%. A higher proportion of SMU long stay patients went home. ARMC had the lowest average LOS for long stay patients discharged home. For the 18% of long stay patients discharged to other hospitals, there was a high degree of variability between hospitals and between GMU and SMU in both the proportions discharged and the average LOS. Overall average LOS was 28.3 days.

Only 5.1% of long stay patients were discharged to a nursing home, with an average LOS of 30.9 days. The proportion of GMU long stay patients (8.6%) discharged to nursing homes was greater than for SMU patients (3.3%). There was a high degree of between hospital variability in both the proportion of separations (GMU 5% -12%) and average LOS (GMU 21.5 days - 38.5 days) for this discharge destination.

It is evident that efficient discharge management of medical in-patients relates to the availability of community-based support, either at home or in subacute care or aged residential care. The reasons why almost 60% of multi-day medical in-patients with a LOS greater than 13 days remained in hospital for longer periods before discharge home were not clear and warrant further investigation. It would be unusual for this prolonged LOS to be based purely upon need for acute clinical care, particularly in view of findings from the census study, which demonstrated the likely impact of social factors and cognitive state upon LOS.

Census data confirmed findings from VAED

The data obtained from both the census study and the cohort study of individual patient clinical management confirmed the findings from the VAED analyses. There were some differences, as cross-sectional census data were likely to have an over representation of long stay patients when compared to the longitudinal data from the VAED. Nonetheless the same patient characteristics were evident, patients in GMUs were older, had more co-morbid diseases and a longer hospital stay. Other factors, which can not be elicited from the VAED, included a significantly greater level of social and cognitive problems, a requirement for higher levels of assistance with personal hygiene and nursing care and more utilisation of allied health time.

More patients admitted from low level than from high level aged care

An interesting feature identified from the census was the higher volume of patients who were admitted from low level (hostel) aged residential care compared to those from high level (nursing home) care. This may be a reflection of the nature of hostels, where the expectation is that residents are essentially able to look after themselves under minimal supervision of staff with little experience of acute medical care.

The proportion of medical in-patients in the census, who had been admitted in the last month, or had more than 3 admissions in the last 12 months, was 20% for both categories. The characteristics of this group warrant closer examination to determine whether there are opportunities to minimise requirements for recurrent admission, either by better discharge planning or by examination of opportunities for care coordination leading to improved community-based management.

Factors which affect hospital stay include: living alone, increasing dependency, impaired cognitive function, depression, need for residential aged care placement

Social factors were identified by medical and nursing staff as likely to affect LOS for a high proportion of patients, more so for patients in GMUs than SMUs. The specific factors identified included living alone; higher levels of dependency for care; additional home and carer supports required and, for those patients unable to return home, transfer to aged residential placements.

Patients in SMUs had better functional status and required less nursing care and assistance with personal hygiene, than patients in GMUs. A high proportion (35%) of patients in the cohort study was considered to be at risk of psychiatric co-morbidity, with a larger proportion of GMU patients at risk of depression. Recognition of the potential for psychiatric co-morbidity needs to be emphasised to treating medical staff, as they did not identify these levels of depression and/or anxiety as active co-morbidities in either the census or cohort study patients. Cognitive function was worse for GMU patients. This would be an anticipated outcome for a group of patients who are older, more frail and less oriented.

In both the census and cohort studies, the reasons why patients remained in hospital were identified. In particular, data were collected on whether patients were medically ready for discharge on that day. For the patients who were not medically ready for discharge, SMU patients were not less likely to be waiting for tests than GMU patients were. However, the disoriented patient was more likely to have social factors affecting LOS, suggesting that the needs of this group in particular present a challenge in relation to discharge planning.

Specialist Medical Unit patients are 3.5 times more likely to go home on the day they are medically fit for discharge

The census study data demonstrated that SMU patients were 3.5 times as likely to be discharged on the day they were medically fit for discharge, compared with patients in GMUs. Where patients were identified in the census study as medically fit to be discharged, but a decision was made not to discharge the patient on that day, further questions were asked to elicit the reasons behind this decision.

The major reason for patients remaining in hospital related to "access blockage" to aged residential care. Other reasons included failure of internal processes. Most of these related to delays in the completion of medical, subacute and aged care or allied health consultations or, for a very few patients, waiting the outcome from specific tests. The issue of managing the delays in availability of tests, results and additional consultations appeared to be a relatively minor, albeit important issue. A small proportion of patients were waiting for availability of additional home and carer supports.

Age alone does not account for staying in hospital beyond 13 days

Using the census data, a multiple logistic regression analysis of factors responsible for a patient being in hospital beyond the 13th day of their in-patient episode of care suggested that this was most likely to be accounted for by social factors, impaired cognition and patient nursing care needs. After adjustment for these factors, age was less likely to be associated with a stay in hospital beyond the 13th day.

When examining opportunities for improved efficiency in managing in-patient episodes of care, availability of appropriate high and low level aged residential care was the key issue.

General Medical Unit patients have more Allied Health services provided

Patients in GMU made more use of allied health (AH) services in both the census and cohort studies. Lower usage of AH was seen at The Alfred in GMU. In the other hospitals, approximately two-thirds of all GMU patients were seen by AH staff. Overall less than half of the SMU patients were seen by AH. Physiotherapy provided the largest volume of services to both GMU and SMU. As some of the internal process time delays for patients related to completion of AH consultations, this should be reviewed by all AH service providers. In addition, the variability in service provision across the GMUs may warrant investigation at specific sites. For instance, the lower level of social work service delivery for GMU patients at RMH may be a key factor in the longer LOS seen in this patient group at this hospital.

Consumers praised staff for professional attitudes

The consumer perspective was obtained by using a representative sample of GMU patients in focus group settings from 2 of the 5 hospitals. The focus groups set out to identify the primary issues of importance in hospital care as perceived by recent medical in-patients. Both hospitals received high praise from participants and they were particularly generous in their comments on staff abilities and friendliness.

Consumers wanted more information about after-hospital care

The primary outcome from the focus groups was recognition that the most important aspects of hospital care change as patients' situations change. At the time of admission, being settled in a ward quickly was perceived as essential. Patients did not feel they had really been treated, or that they could commence recovery, until they were settled in the ward. Relationships with staff during the hospital stay were critical in determining patient perception of care. Confidence in staff abilities, as well as being treated with courtesy and respect, were tightly linked to helping patients feel integrated with their care program and able to ask questions of staff caring for them. As patients began to improve, planning for discharge became the most important issue. Participants were curious about preventing a recurrence of the illness, as well as preoccupied with ensuring they made appointments with specialists, where appropriate, after discharge. Most participants felt they did not have enough information about after-hospital care.

Implications and Future Directions

This study arose from the observation that bed-day usage for multi-day stay medical in-patients was increasing at a time of increasing demand for access to acute hospital beds in Melbourne, a phenomenon that has been observed internationally. The further observation that the LOS for patients with similar discharge diagnoses, as described by DRGs, managed by GMUs was longer than for patients managed by SMUs within the same hospital prompted the desire to better understand the factors which might contribute to this.

The problems confronting hospitals in delivering acute services are complex. Optimal responses require careful analyses. Simple solutions are not immediately apparent and rational solutions may demand changes to service delivery systems, inter-agency collaboration and the greater use of evidence to inform best practice. Cultural change and clinical leadership are vital to successful change, along with continuing education of clinicians from all professions. Risk management strategies may be one way of improving patient outcomes and resource usage, when changes are introduced.

The next steps are to examine how performance might be improved in the management of the acute episode of care for admitted medical patients. This should lead to better utilisation of available resources, both for the benefit of those receiving care and for those seeking access to care in the acute hospital setting.

How should these findings be used to best inform efforts to reform the process of care so as to improve outcomes for patients, reduce variation in clinical practice and to improve access to services?

Aligning clinical and organisational goals

Aligning clinical and organisation goals as demonstrated by Royal North Shore Hospital (RNSH) led to better use of resources by clinicians without compromising the quality of care delivered. In order for this to be successfully achieved in the five hospitals studied, it will be important for both clinicians and administrators to invest time in developing clinical leadership skills as the first step towards aligning clinical and organisational goals and responsibilities.

Improved data availability and dissemination to all groups involved in patient care

Increased support at the hospital level with appropriate data collection systems and analyses will be essential in supporting clinical leaders. Both unit-specific and hospital-level comparative data will be needed if further gains in health care reform are to be made. System-based performance improvements should aim to shorten LOS for both the short LOS patient group and for the smaller group who have a LOS $\geq$ 14 days, as a proportion of the episode of care is likely to include days in hospital beyond the point where discharge was appropriate on medical criteria. This will require transparent clinical accountability for systems and processes of care as well as patient outcomes. Peer-to-peer accountability may well prove to be an important driver for change in this area. Performance indicators need to be developed which specifically relate to the management of discharge of patients, as a mechanism to assist with engaging clinicians in the ownership of discharge planning processes.

Foster collaboration between hospitals to gain improvements in clinical performance

Increasing the collaboration between hospitals, especially on activity performance in the management of medical multi-day stay patients should lead to a better overall use of resources throughout the system. A roundtable forum, sponsored by the Department of Human Services, which initially has representation from the 5 hospitals in this study, could be an appropriate method for facilitating collaboration. The forum should aim to include all metropolitan hospitals in the longer term. It may be also possible to involve rural hospitals through teleconferencing links. This forum would need to have specific terms of reference developed to ensure that small variations in practice with small patient numbers are not being considered in detail, to the exclusion of system-wide issues.

More senior staffing in general medicine units including a mix of full time and sessional senior medical staff

Further consideration needs to be given by hospitals to the level of senior medical staffing provided in GMUs. The use of sessional medical staff exclusively may not be the most appropriate way of providing adequate clinical expertise and supervision to junior staff rostered to care for patients in GMUs. In this study, two different models for providing more availability to senior staff have been briefly outlined. In one model (RNSH), as part of the hospital's access and demand management strategy, an additional full time doctor was added to the staff to assist with ensuring clinical goals met organisational goals, particularly in the area of medical responsibility for discharge planning. In the other model at SVH, a senior non-rotational registrar position which provides assistance to any GMU junior medical staff has been in place for several years.

Geriatric patient management skills are needed by all health professions working in general medicine

As the patient population being managed in GMUs is older, with the average age over 70 years, hospitals need to reconsider the clinical skill mix required to manage patients. Most do not have a geriatric consultant as part of the GMU medical team. Access to their particular skills and knowledge may be helpful in ensuring optimal clinical care. All staff caring for patients in GMUs should have access to further training in the care and management of geriatric patients, which may also lead to improvement in LOS. Management approaches for older patients with acute illness, which include programs aimed at maintaining or improving their functional status, appear to assist with timely discharge. From our data, it was also apparent that there needed to be greater recognition of, and management strategy implemented for, possible psychiatric co-morbidities which may also reduce inappropriate LOS and lessen re-admission rates.

Encourage proactive clinical risk management by all professions

The development of medical assessment and planning units, through which all general medical patients are channelled and management programs quickly established, appears to be an effective way of ensuring appropriate care programs were implemented. This facilitates risk assessment and proactive allied health treatment. Clinical assessment, which includes screening for cognitive status and depression and which gives a precise description of pre-morbid and current functional status should be completed within 24 hours of admission. This will enable all multidisciplinary staff to implement strategies to reduce any adverse risk for patients and commence early discharge planning. Where staff activity and performance in clinical management of patients is informed by data and linked to patient outcomes, such as appropriate LOS or timely institution of home support services, delays in discharge are reduced.

Build key indicators around discharge performance

General indicators may be built around discharge performance. From the 1999/2000 data, 87.4% of multi-day stay medical in-patients were discharged in 13 days or less. If a performance benchmark of 90% had been in place and the target met, a further 1198 patients would have been discharged earlier. At a minimum, this would have released over 15,500 bed-days in 1999/2000. Based on the overall 1999/2000 average LOS for these medical in-patients of 7.2 days, this would have provided one additional bed per day at each of the 5 hospitals. A modest increase in performance but nonetheless a potential opportunity for improvement and relief of some of the pressure in the health system for bed availability. How best to reach such a target might involve judicious development of key performance indicators related to discharge planning requirements for both short and long stay patients.

Review casemix funding to include both impaired cognitive status and social factors

Casemix funding for common DRGs such as heart failure, chronic obstructive pulmonary disease and respiratory infections need to be further investigated to include impaired cognitive function as a specific co-morbidity. Disorientation and loss of other cognitive abilities were major factors contributing to increased LOS for patients with these conditions, irrespective of whether managed under GMU or SMU. For implementation of this in the casemix formula, a validated instrument measuring cognitive function would have to be recorded for patients, where this classification was being sought. This should be included in the risk assessment instrument completed on admission. Consideration should also be given to developing a method for including social factors, such as living alone, and pre-morbid functional status as "complications" in the casemix formula, as they also adversely impact on LOS for medical in-patients.

Separate roles for assessment of subacute and aged care and provision of services

At present the assessment of patients, who have been identified by the acute hospital physicians as needing access to subacute care facilities, is frequently undertaken by the key providers of such care. We propose that separation of these roles be considered, so that it is transparent that the needs of the patient are paramount in the decisions being made, rather than using the assessment as a means of rationing access to aged care or subacute facilities. This may also facilitate better integration of acute care with ongoing community-based aged care.

The availability of both subacute and community aged residential placement will be an ongoing issue with the potential for escalating demand over the next 10 to 20 years. Aging of the population is well documented, but there has not been a concomitant increase in aged residential facilities. One of the potential alternatives in increased community support to reduce the need for additional facilities may be to increase the funding for at-home carers (relatives, neighbours or people employed as in-home carers). Projections for the reduced availability of informal carers and variable availability of such care across SLAs suggest that this issue will require urgent attention at the policy level, if it is not to contribute increasingly to the access/demand problem in acute care.

Investigate methods for increasing availability and use of HITH, PAC and HACC

The use of substitution services, such as Hospital at Home (HITH) and Post Acute Care (PAC), warrants further investigation at the clinician level as well as at the hospital executive level. There is a need to determine why clinicians do not use these services more widely. Anecdotally, it appears that some of the services may be difficult to access or that patients are required to go onto a waiting list, which again will lead to patients remaining in acute care longer than medically necessary. This may also be the case with home and community support services (HACC) provided by the local government sector. Further investigation is warranted to establish the reality of service demand and supply, particularly the provision of services during out of usual business hours.

Research needed into characteristics of long stay patients

Further research into the reasons why medical in-patients remain in hospital beyond 14 days is warranted. Approximately 60% of these patients managed in both GMUs and SMUs ultimately go home. It is unclear why they remain on average almost twice as long as those patients who are discharged home in less than 14 days do. The potential contribution to increased LOS for such patients from impaired cognition and social factors, as identified in this study, warrants urgent attention. A 10% improvement in LOS for this group would represent 23 beds becoming available (i.e. nearly 5 additional beds available per day at each of the 5 hospitals). This represents a potential opportunity to contribute to demand management and to reduce access problems at these acute hospitals.

With the aging of the population, demand for medical care is increasing. Simultaneously there are new modes of care for common chronic medical conditions, further fuelling both demand and society expectation. Future demand management for acute health services will require either higher levels of investment in acute hospital-based services or redeployment of patients to alternative care settings, once the acute phase of the episode is finished.

Process redesign to improve internal hospital performance

Some potential for improvements in efficiency of care during the acute episode can be identified from these studies, chiefly as they relate to discharge planning and particularly in relation to ensuring that patients who are medically ready for discharge are indeed discharged. Development of performance indicators, particularly for consultative services, would focus attention on the potential for improvement in this area.

Facilitate provision of post-acute care services

Urgent attention is needed to develop policies to facilitate the provision of post-acute care in settings which are more appropriate to need and cost less than the continued provision of such services in the acute hospital setting, as at present. If demand for acute hospital services is to be managed more effectively, ways for reducing inappropriate occupancy of acute hospital beds by patients during the post-acute phase of illness must be examined. The impact of social factors and cognitive function on the likelihood of an extended LOS has been clearly identified in this report. These seem to be obvious areas for targeted interventions to reduce an unnecessary component of acute hospital LOS.

It is highly likely that a shortage of residential care facilities (chiefly nursing home beds) is a factor contributing to prolonged LOS for complex medical patients. The availability of informal carers and the support services needed to provide in-home care in the post acute phase as potential contributory factors needs examination. The potential for transitional care programs to contribute to post acute care, either in the home or in appropriate facilities, warrants further investigation as a means of managing demand for acute services.

Streamlining and integration of services providing home supports are needed

Unfortunately a mixture of home support services is currently provided across three levels of government in a multitude of programs. There are very few incentives for a rational and cohesive approach to targeted delivery of services to a small group of people who happen to have a major impact on demand for hospital services, because of inability to provide appropriate and effective service delivery in alternative settings. Reform in this area is urgently required if improvements in access to acute hospital services are to be achieved.

Conclusion

The provision of clinical services in SMUs did not lead to better LOS outcomes for patients with complex medical conditions including impaired cognition and other social factors, than management by GMUs did. Socio-economic factors and the differential availability of sub-acute services and both formal and informal community-based residential care complicated the identification of differences in performance between hospitals.

In the management of this group of patients, there is potential for redesign of the day-to-day clinical processes of care within hospitals to contribute to improved performance (reduced LOS). Such potential for improvement needs to be identified and realised in order to improve access in the setting of constrained resources, as there is relatively fixed acute hospital bed availability. A specific factor, which should be considered in process redesign, is the level of seniority of staffing from all professions for patients in GMUs.

Promote and develop clinical leadership to:
- **assist with re-engineering of clinical care processes**
- **align clinical and organisational goals to ensure the best outcomes for patients and the community**

The potential for reform of management processes for long stay patients has led to a focus on the very important issue of access to residential aged care. Nonetheless, the fact that most long stay medical in-patients ultimately went home suggests that reform of their process of care will need to be more closely examined. Social factors, cognitive function and possibly depression are factors likely to affect LOS and should form part of this study.

At the hospital resource level occupied bed-days are critical, whilst for clinicians bed availability is the key issue. For demand management, the issue is the timely availability of an appropriate bed in relation to predicted demand, in order that both emergency and elective admissions can both be readily accommodated.

It seems highly likely that if resource management (hospital bed-days) in hospitals is to become an issue of clinical importance then organisation of care delivery will need to change, particularly for the complex medical patients commonly managed in GMUs.

General medical units will continue to provide on-the-job training and experience for junior medical, nursing and allied health practitioners. In this context it may be important for GMUs to be staffed by a mix of fulltime and sessional senior medical staff. These staff will require better management skills. Training should be provided to foster clinical leadership that is focussed on the integration of organisational goals, chiefly increasing efficiency of hospital resource utilisation, with clinical management and better patient outcomes for the increasingly complex group of patients in GMUs. In addition, training for general medicine consultants and trainees should be better integrated with that provided for geriatric medicine.

Key Messages

Hospitals generally manage multi-day stay medical in-patients by admitting:-

- Older patients with multiple co-morbidities, impaired cognition and social factors affecting length of hospital stay (LOS) into general medicine units
- Younger patients with complex single system diseases but with fewer co-morbidities and social factors affecting LOS into specialist medicine units

Acute General medicine is: -

- Perceived to be of lower status than specialist medicine and is staffed by more junior medical, nursing and allied health staff who rotate frequently
- As efficient as specialist medicine units in managing patients after adjustment for appropriate confounders
- Different from geriatric medicine which focuses on sub-acute care

Analysis of administrative and census data identified:

- Characteristics of medical patients:
  - Demographic features, such as age and gender
  - Clinical features, such as psychosocial factors, cognitive and functional status
  - Clinical conditions
- LOS variability between general and speciality medical units
- Influence of discharge destination on LOS
- The small proportion (12%) of patients who stay for more than 13 days in hospital and utilised 48% of available bed-days. Nearly 60% of this group were then discharged home
- Variations in LOS between hospitals for particular common high volume clinical conditions
- The use of subacute care and nursing home as discharge destinations varied greatly between hospitals
- In-hospital delay for patients awaiting aged residential care placement

Opportunities for improved demand management include:

- Redesign of internal processes to improve coordination of consultations within hospitals and to improve the congruence between ready for discharge and the actual discharge day
- Development of between-hospital comparative clinical data reports which are relevant to clinicians and have the potential to drive change and reduce variation in clinical practice

2. Literature Review

2.1 Introduction

Over the past decade rapid changes have occurred within the Victorian public health system. The ageing population, advances in technology and higher community expectations have increased demand resulting in system changes to reduce the escalating health care budget. Cost containment has entailed bed closures and changed work practices by hospital staff. For example, between 1987-8 and 1994-5 there was a decrease in the number of beds from 3.2 to 2.8/1000 population, the average length of stay (ALOS) from 6.4 to 4.2 days, and an increase in the number of same day admissions whilst bed occupancy has remained constant at 80%[(1)].

In the year 2000, the Victorian public hospital system is struggling with unprecedented problems dealing with demand for services which far exceeds supply. Key indicators of this include high levels of ambulance by-pass, increased blocks to admissions and a significant decline in access to residential and extended care services[(2)].

The issues experienced throughout the Melbourne metropolitan region can be demonstrated by using the Royal Melbourne Hospital as an example. For management of its health services, the Melbourne metropolitan region was divided in 2000 into 12 area boards and the Melbourne Health Board has responsibility for the management of the Royal Melbourne Hospital (RMH)[(3)]. Between 1998-9 and 1999-2000, the RMH experienced a 5.1% increase in Emergency Department (ED) attendances that translated to a 5% increase in requests for admission from ED. Thirty-nine percent of these requests related to people aged 70 years and older. During this timeframe, elective admissions declined and emergency admissions increased, with the number of bed requests being denied due to bed shortage (blocked admissions) rising from 37 per month to 156[(2)]. The change in balance between emergency admissions and elective surgery makes it difficult to predict demand for acute hospitals beds.

The Winter Emergency Demand Strategy Review for RMH suggested that waits in the ED were related to high numbers of medical bed days, in particular, the increased proportion of bed days used for nursing home discharges[(2)]. Whilst a proportion of blocked admissions can be attributed to bed closures as the result of nursing shortages, it is impossible to ignore the impact of longer lengths of stay for patients awaiting nursing home placement. During the period 1997–2000, a redistribution of sub-acute beds, including 180 interim nursing home beds, occurred throughout the North West Region of Melbourne and these changes led to a drop in the traditional number of sub-acute beds available to RMH[(2)]. Inevitably, these changes affect hospital throughput by creating an exit block. However, within the Winter Emergency Demand Strategy Review, other hypotheses regarding longer lengths of stay in Medical Units have not been examined, for example, the complexity of general medical patients leading to longer lengths of stay or the availability of home and carer supports.

The redistribution of sub-acute beds within the Melbourne Health region may well impact upon the type of medical patients being managed within the RMH. The following figures suggest that there is an increase in the number of geriatric type patients. Acute care patients identified as equivalent to Geriatric Evaluation and Management (GEM)[1] occupied the equivalent of 15.6 acute bed days per annum at 100% occupancy during 1998-2000. Of note is an increase in the number of GEM type patients that are discharged directly to home, 56% in 1998-99 and 67% in 1999-2000. At Melbourne Extended Care & Rehabilitation Service (MECRS), the traditional provider of sub-acute care services for Melbourne Health, there has been a decreasing number of GEM patients (34% 1998-99, 30% 1999-2000) with an increased use of bed days by GEM patients (42% 1998-99, 53% 1999-2000). In addition, 84% of GEM patients over this timeframe have been emergency admissions "suggesting they may have some acute condition which must be resolved prior to suitability for sub-acute care."[(2, p31)].

Many elderly patients present complex medical, social and psychiatric challenges[(4)]. They may suffer with 'geriatric syndromes' such as depression, cognitive impairment, poor mobility, falls and incontinence and experience further functional decline during hospitalisation. The functional decline experienced whilst in

[1] Geriatric Evaluation and Management (GEM) equivalent patients are acute care patients who have some characteristics of patients typical of sub-acute care settings. They are defined as patients aged 65 years or older who have a LOS of more than 5 days and who fall within a defined set of DRGs [(2)].

hospital may contribute to longer lengths of stay, increased risk of complications, iatrogenic events, loss of physical performance and the need for transfer to sub-acute and/or residential care[4]. Appropriate geriatric care whilst in an acute hospital may limit the functional decline and lead to earlier transfer home or to the sub-acute sector for rehabilitation.

The impact of the trends of an ageing population in combination with increasing emergency admissions suggests that the nature of medical patients managed as in-patients may be changing and warrants further investigation. Specifically, there is a need to describe the complexities of general medical patients and requirements for care including those for effective and timely discharge, which may have implications for staff training and bed allocation within hospitals.

2.2 International Experience

The trends occurring in Victoria are not dissimilar to experiences internationally. The United Kingdom, New Zealand and Canada, all report decreasing bed stock, increasing or stable numbers of admissions and decreasing lengths of stay[5].

Lane, Monefeldt and Rosenhead (1998) refer to the semi-permanent crisis afflicting the British health system, which has seen the closure of 11% of acute hospital beds between 1990-1996[6]. Indicators of the crisis include repeated reorganisations, closure of facilities, lengthy waiting lists, cancellation of elective admissions, and the depletion of budgets prior to end of the year leading to a reduction in activity. Emergency Departments have experienced increased attendances and difficulties with admitting patients to beds resulting in long waiting times in the ED and the need for ambulance bypass. The balance between emergency and elective admissions has altered with emergency admissions rising from 56% to 61%, increasing the proportion of in-patient work coming from the fluctuating and unpredictable demands of emergency admissions[7].

A critical appraisal of literature conducted by New Zealand Health Technology Assessment Clearing House (NZHTA), concluded that there was an increase in both the absolute number and the rate of admissions. This was most pronounced for acute medical admissions and less apparent for acute surgical or arranged/waiting list admission[8]. At the same time, the complexity of acute medical admissions was increasing whilst the average length of stay was reducing. They suggest that a reduced length of stay has facilitated a higher number of admissions with either fixed or reduced bed stock. NZHTA conclude that the increased number of acute admissions has implications for the health care budget; providers of secondary care; the ability of hospitals to undertake non-urgent work and staffing issues such as increased pressure, difficulty planning staffing levels and implications for professional eduction[8].

Brownell et al (1999) report similar findings in Winnipeg, Canada. During 1991 to 1995, 21% of acute hospital beds were closed. Even so, their study revealed that "access to hospitals in terms of the number of patients treated, was not compromised"[5, suppl p137]. Rather, there were reducing lengths of stay that were most noticeable amongst the surgical population and an increased use of outpatient surgery. During this period, medical separations remained relatively stable and also had reducing lengths of stay but not to the same degree as the surgical patients. The bed closures in Winnipeg were accompanied by a 3% increase in the number of nursing home beds, which allowed timely transfer of patients and ongoing availability of hospital beds for patients with acute illness. The impact of the availability of nursing home beds is highlighted by the removal of 40 nursing home beds in 1995, accompanied by a 10.1% increase in long-stay patients in acute care hospitals. A similar situation was faced by RMH during 1997-2000 with a redistribution of sub-acute care beds. Brownell et al (1999) surmise that access to nursing home beds helps hospitals respond effectively to downsizing and assists hospitals to provide access to acute care by removing exit blocks. The relevance of this finding is vital for future research into access and timely discharge to/from acute hospital beds[5].

The appropriateness of admission to an acute hospital setting is an issue which has been raised in the literature. A number of studies have suggested that high proportions of acute medical admissions are inappropriate[8]. The review conducted by NZHTA (1998) explored the phenomenon of inappropriate admissions and concluded "defining the appropriateness of admissions is highly problematic"[8, p72]. The authors came to this conclusion because many of the studies employed retrospective analytical techniques and whilst this technique is able to determine the appropriateness for the entire episode of care in hindsight, the instruments are not useful for clinicians at the time of admission[8]. The Scottish Intercollegiate Working Party in their evaluation of Acute Medical Admissions and the Future of General Medicine supported this

concept[9]. Further work in this area reviewed the validity of tools which are commonly used when appropriateness of admission is being formally evaluated[10]. These tools included – Intensity of service, Severity of illness, and Discharge screens; AEP – the Appropriateness Evaluation Protocol; and the MCAP – Managed Care Appropriateness Protocol. From this work the conclusion was drawn that these tools were not sensitive in identifying acute care needs of patients and that caution should be used when interpreting outcomes associated with their use. A systematic review of methods and results in measuring the appropriate use of acute beds also concluded that more work was needed in the validation of tools relating to appropriateness of admission before results could be considered to be reliable[11].

Flintoft et al (1998) in Ontario undertook a large study on appropriateness of admission using an opinion-based classification system[12]. These researchers conducted a structured case note review of 13,242 admissions at 98 hospitals. They retrospectively rated acuity of admission into three levels of care: acute, subacute and non-acute. By including a subacute category, it was possible to separate patients who needed hospital level of care but allowed a less intensive category of care to be considered. The patient's acuity level was assessed on the day of admission and subsequent in-hospital days. The study demonstrated that a substantial proportion of patients that previously would have been classified as non-acute, i.e. not requiring acute medical in-patient care actually required sub-acute care for some or all of their hospital stay[12]. The authors suggested that the inclusion of an intermediate tier of care would enhance the use of acute hospital beds whilst allowing older people with chronic conditions more time to return to their pre-admission status[12]. In Victoria, this intermediate level of care is provided through extended care and rehabilitation centres but access to sub-acute care beds is not always available resulting in patients remaining in acute care beds for longer than required[2].

These findings[12] are supported by Decoster et al's work (1999) in Manitoba, Canada[13]. These authors identified that a significant proportion of medical admissions were inappropriate and significant numbers of the patients could be managed in alternative settings, in particular, nursing homes[13]. The three studies by Brownell et al (1999)[5], Flintoft et al (1998)[12], and DeCoster et al (1999)[13] all highlight the need for a systems approach when considering the issues impacting on acute public hospitals. There are many issues external to the acute public hospital that have implications for both access and exit, in particular, suitable alternative accommodation for people who require care but not acute hospital care.

An increase in acute (emergency) medical admissions in an environment where there are decreasing acute in-patient beds and reducing lengths of stay is also evident in Scotland. In response to these trends, the Scottish Medical (Physician) Colleges have highlighted the implications for the delivery of medical care and the quality of patient care in their evaluation of Acute Medical Admissions and the Future of General Medicine[9].

Over the past two decades there has been increasing specialisation in medicine that "is leading to a perceived lack of clarity about the future of general internal medicine and the role of the general physician"[9, p2]. Increasing specialisation is a natural trend when considering the growth in new medical knowledge. There is increasing evidence of the effectiveness and efficiency of treating certain acute medical cases within specialist units such as coronary care, gastro-intestinal bleeding and stroke units[9]. Nonetheless, there is a clear need to have general physicians as many patients have multi-system diseases and others do not have a defined diagnosis upon presentation. The Scottish Medical (Physician) Colleges believe that it is generally accepted that specialist (SMUs) and general medical units (GMUs) should work together in close parallel[9]. Of more concern is the separation between medical and geriatric care, given the ageing population and the increasing age of acute medical patients.

It is predicted that between 1998 and 2051, the proportion of the population aged over 65 will increase from 12.2% to 24.2%[14]. This has significant ramifications for health care, as now the elderly (65+) population comprises only 12.1% of the current population but account for 30.2% of total acute hospital separations[14]. These statistics give weight to the consideration of developing a stronger linkage between general medicine with geriatric medicine, as a significant amount of general medicine is involved in providing services for the elderly and this will increase in the future. Closer working relationships between General/Geriatric medicine could streamline the care processes, for example, common assessment and dual receiving systems, and ultimately improve the outcomes for the elderly[9]. This has implications for medical training, along with other health care disciplines. The Scottish Medical (Physician) Colleges advocate that junior medical staff in general medicine and geriatrics have the opportunity to rotate through the discipline in which they are not specialising, for example, geriatric staff rotate for a period through general medicine and vice versa[9].

There would also be value in acute medical nurses having the same opportunity. A study involving gerontologic advanced practice nurses demonstrated the effectiveness of involving these geriatric specialists in the initial assessment and discharge planning processes for elderly patients[15]. By adequately assessing the functional status of elderly patients including weakness, gait impairment, decreased ability to perform activities of daily living and ability to self-manage complex medications regimens, referrals could be made to appropriate community support services to assist to improve quality of life and prevent unnecessary re-hospitalisations[15]. An expanded allied health professionals' role and the use of multidisciplinary teams also warrants further consideration when considering the requirements of the elderly.

2.3 Bed Flow Modeling

In an attempt to forecast and develop a greater understanding of demands for hospital beds and the implications upon available bed capacity, a number of studies have been conducted modelling bed flow. Lane et al (1998) used a computer model to explore the dynamics of an ED department using a systems approach[6]. The systems approach enables consideration of how different features interact and co-produce effects. This study's primary purpose was to explore the sensitivity of waiting times in ED to changes in hospital bed stock. The study was also expanded to consider the impact of demand patterns and elective patients.

Lane et al's study (1998) involved creating a 'base case' depicting the dynamics of an ED[6]. The 'base case' was then exposed to a number of scenarios such as changes in bed capacity and pattern of demand. Lane et al (1998) concluded that restricting bed capacity led to the cancellation of elective admissions and did not increase waiting times in ED. They surmise that cancellation of elective admissions works as a 'safety valve' for hospitals in order to divert a bed crisis ED[6]. Millard, Mackay, Vasilakis and Christodoulou (2000) have also demonstrated this phenomenon[16]. They found that as emergency surgical admissions increased there was a decrease in the number of elective surgical admission, thus maintaining a steady rate of surgical cases. Royal North Shore Hospital (RNSH) also describes cancelling elective medical and surgical admissions to avoid restricted access to the ED[17].

Bagust et al (1999)[7] took Lane et al's[6] study one step further to look at the impact of demand for emergency admission on the use of bed stock. They modelled the dynamics of the hospital system, using a discrete-event stochastic model[7]. The aim was to examine the daily bed requirements arising from the flow of emergency admissions to an acute hospital and the implications of fluctuating and unpredictable demands for emergency admission. The study revealed that there was minimal risk of having no bed available for a patient requiring immediate admission if the average bed occupancy remains below 85%. Above this level, the risks become substantial[7]. It is of significance to note that when a hospital experienced a day where no further admissions could be accommodated, it took a period of time equal to twice the average length of stay to recover. In the study example, it indicated that a hospital with average occupancy of 85% that ran out of beds 4 times per year might be disrupted for up to eight weeks[7]. This has implications for hospitals with higher levels of bed occupancy, as the risk of running out of beds is greater, and the length of recovery multiplied, leading to bed crises on an ongoing basis. This principle demonstrates the implications of queuing theory on systems with fixed or limited capacity. Bagust et al (1999) concluded that fluctuations in emergency demand affect quality of care and hospital efficiency and spare bed capacity is essential for effective management of emergency admissions[7].

Millard et al (2000) highlighted that indicators such as average length of stay, average occupancy and average admissions are misleading and demonstrated this by comparing two groups of surgical patients – the simple and the complex[16]. Simple surgical patients are those with shorter lengths of stay (ALOS 4.8 days) and less use of resources, complex are those patients with longer lengths of stay (ALOS 20.4 days) and a higher demand on resources. These two groups demonstrated two streams of bed flow. Deriving ALOS from their combined length of stays provided misleading results but by separating and analysing the groups separately, it enabled the flow model to demonstrate different resource use and provided focus for how to improve the quality of patient care[16]. This is understandable given that LOS is influenced by many factors including: individual characteristics of the patient; range and quality of hospital services; and availability of community care[6]. It would be of benefit to explore the transferability of this model to studying acute medical patients.

Millard et al (1999) used the data for these two groups of surgical patients to analyse the bed flow and then manipulated the flow model to evaluate the effect increasing bed capacity and changes of LOS would have upon the overall throughput of the hospital[16]. They demonstrated that energy focused on decreasing the length of stay of the 'simple' acute patients and increasing the bed capacity only provided short-term gains,

whereas concentrating on the prevention and management of complexity is both more effective in reducing length of stay and sustainable over the longer term[16].

These authors also discussed the use of flow models to compare different medical units but cautioned the need to consider some key factors prior to this, namely, that speed (LOS) does not indicate quality of care, rather, quality is gauged by the impact of the medical or surgical intervention[16]. In addition, any performance comparison has to take into account degrees of difficulty. Both these points are pertinent when considering the performance of SMUs and GMUs, with SMUs generally managing patients with single system disease and GMUs caring for patients with complex multi-system disease. Millard et al (1999) also commented upon discharge destination impacting upon perceived performance eg if there were nursing home bed shortages this could lead to longer lengths of stay and be interpreted as poorer performance[16].

Bed flow models have the potential to drive change by aligning clinical goals with organisational goals, a key determinant for enlisting the support of clinicians. The key findings from these flow models indicate that elective admissions are likely to be cancelled as demand increases for emergency admissions and hospitals require spare bed capacity to function efficiently and enable turn over of patients without causing bed blocks. Finally, improvements in the quality of patient care focusing upon preventing and managing complications will have sustained effects upon bed usage, for example, proactive multidisciplinary involvement, clinical practice guidelines and disease management.

2.4 Looking for improvement

The increasing demands on the hospital system and the ongoing pressure to be more effective and efficient leads many hospitals to review their processes and systems in search of improvement. Degeling, Kennedy, Hill, Carnegie & Holt (1998) evaluated the impact of the trend towards increasing clinician involvement in management to engender a more financially driven and output orientated approach to service delivery, and how hospital staff had adopted this perspective[18]. Their study revealed that the impact varied between professional groups and that it was difficult for the professional sub-cultures to adapt to this imposed change. Essentially, the economic imperative is often in conflict with the patient centred view of both medical and nursing staff. The review of work processes that engenders a multidisciplinary approach is fraught with difficulties due the medical (individualist) and nurse (collective) concept of clinical work. In order to implement change these two hurdles need to be overcome. Degeling et al (1998) recommend that in order to implement changes to deal with the current issues in the health care system, there are a number of new perspectives that both nursing and medical staff need to adopt:

- "An acceptance of the interconnections between the clinical and resource dimensions of care
- A commitment to implement structures and methods which bring clinical work within the ambit of work process control
- An acceptance of a model of clinical unit management which emphasises the benefits of systems for monitoring performance with respect to resource usage, efficiency, effectiveness, appropriateness and quality
- A perspective which seeks to balance clinical autonomy with accountability to management and which argues for displacing existing personalised and organisationally opaque accountability systems with structures and methods which engender greater transparency"[18, pvi].

Royal North Shore Hospital (RNSH) appears to have embodied a number of these perspectives[17]. RNSH (2000) provides a benchmark for demonstrating the effects of implementing a clinical practice improvement process. RNSH was seen as one of the worst performers in relation to restricted access to emergency, which had ramifications for the entire hospital in relation to bed management and access for elective patients. By implementing a range of initiatives, RNSH is now seen as a best practice example for appropriate bed utilisation. RNSH used a collaborative approach that involved executive commitment, co-operation between clinicians from nursing, medical and allied health and team building to re-engineer their bed management approach. Initiatives implemented included:

Structural Changes

- Emergency Department incorporation in Division of Medicine

Policy Changes

- Restricted access became the responsibility of the entire Division of Medicine

- Weekend leave patients were discharged for outpatient management rather than being granted leave for periods of 48 hours or more over weekends
- Over-census beds - wards with a full complement of nursing staff accepted one patient in excess of the regular bed allocation, in times of desperate bed shortages

Team Building Initiatives

- Daily team meetings with divisional nursing unit managers, clinical supervisor and bed manager
- Friday afternoon meetings with all medical registrars, divisional medical and nursing heads, clinical supervisor and bed manager
- Data provision to medical staff about clinical practice variations, such as length of stay

Clinical Initiatives

- Ambulatory care ward open 7 days per week with extended hours of service. It currently treats 700 patients per month who previously required in-patient beds
- Early morning blood collections for patients awaiting results prior to discharge
- Day only angiography including patients awaiting results prior to discharge
- Fax referral to rehabilitation beds to expedite transfer
- Weekend discharge rounds by divisional medical head and clinical supervisor

Accommodation Initiatives

- Reconfiguration of beds to short stay
- Use of off-site residential accommodation for patients not requiring in-patient beds for investigation
- Provision of free transport to patients to facilitate discharge (taxi vouchers, hospital transport)
- Nursing home/hospital liaison committee

RNSH (2000) state that whilst each initiative is straightforward in itself, it is the application of the entire package by a determined team with extraordinary leadership support, that has led to improved access. Additionally it has increased surgical activity in the winter months when there is usually a reduction due to higher demand for emergency admission[17].

The NZHTA (1998) review described and evaluated a number of these initiatives, many with the focus of reducing the admission rate. They identified that the most likely interventions to reduce admissions were macro-management strategies such as closing hospitals, changing reimbursement/fund holding arrangements and public health strategies. Micro-management interventions were also found to reduce admission rates, reduce length of stay and/or improve health outcomes[8].

NZHTA (1998) concluded interventions that are effective at reducing admissions include hospital in the home schemes, comprehensive geriatric care, the placement of general practitioners in the ED, the introduction of various clinical practice guidelines, certain new technologies and the provision of prospective funding. There are a number of other initiatives that may also reduce admissions. These include various public health interventions, home alarms, increased options for long-term care for the elderly, drug education for patients and practitioners, hospital outreach services, the provision of senior staff in ED and the development of ED-based observation and chest pain units. The following interventions appeared to be unsuccessful in reducing admissions, although may improve health outcomes: outpatient-based education for individuals or groups, increased outpatient services, utilisation review and case management[8].

When considering these initiatives, it is useful to have a global view of the continuum of care and to look for efficiencies at each step of the way, for example, access, in-patient management, and exit/discharge planning. The point of access for the majority of acute medical patients is the ED. The ED provides a triage and treatment service for patients who are either, treated and discharged or, admitted to the hospital for care. Traditionally acute medical patients requiring admission are referred to either a specialist or general medical unit and transferred to in-patient beds for management. In recent times, alternative processes have been developed and implemented in an effort to ensure timely intervention, prevent inappropriate admissions and optimise in-patient bed use. Of note are Short Stay Observation Units (SOUs), which function as a filter into the hospital, creating a two stage admission process[8]. Observation units have developed on the premise that certain patients can be observed and treated within the ED environment without need for in-patient admission[19]. In some instances, specialist units have been established, for example, chest pain observation

units[20]. An extension of the 'observation unit' concept is the Medical Assessment and Planning Unit (MAPU). These units are established to receive all acute medical admissions following triage by ED and serve as a focus area for intensive assessment and planning of care, including transfer to the appropriate medical unit for ongoing management[21]. The aim of both the SOU and MAPU is to streamline processes and provide timely and appropriate care, whilst relieving the ED of the responsibility of maintaining patients until in-patient beds become available. Both these initiatives require the re-allocation of hospital beds and resources, including the re-engineering of admission processes.

The provision of timely and appropriate care is also the impetus for introducing clinical practice guidelines, decision support systems and clinical pathways, which all attempt to improve patient care outcomes by prescribing the ideal management for specific patient groups. Clinical practice guidelines also have the potential to provide education regarding the most current strategies for diagnosis and management[22]. Despite this a number of studies report the variations in uptake of clinical practice guidelines and pathways[22]. They suggest that adherence to guidelines is multifactorial and is usually dependent upon the nature of the guidelines, specific clinical problems, patient groups targeted and mode of implementation[22]. For complex medical patients, guidelines may have limited use due to the existence of multiple and frequently interacting, medical problems. A degree of non-adherence to clinical practice guidelines eg, "overriding" is appropriate however, and reflects the individuality of patient needs[23].

A common theme in clinical practice guidelines and pathways is planning for discharge, which is vital for maintaining access to beds in acute hospitals. Discharge planning is a component of hospital care that has been given significant attention over the years and is supported by a plethora of literature. Regardless of the extent to which discharge planning has been explored and reviewed, there is a sense that it is something that hospitals continue to struggle with and invariably do not do well. Inadequate discharge planning can often be attributed to the need to focus on dealing with the acute illness in the first instance and deferring discharge planning to 'another time', as a lower priority. In a busy hospital, 'another time' may not eventuate, as staff are busy dealing with other acutely ill patients, who are given a higher priority. Shorter lengths of stay and higher patient turnover, leaving less time to interact with patients to identify their discharge planning needs, compound this issue[24].

Discharge planning is often considered a multidisciplinary function. It is necessary, however, for someone to assume overall responsibility for coordinating the process[24]. Hospitals use different structures to facilitate the discharge planning process, these vary from designating responsibility to the primary nurse, appointing specific discharge planners, case managers, or a patient care/admission coordinator to developing out reach services such as hospital in the home and home care[25]. Hedges, Grimmer, Moss and Falco (1999) suggest that irrespective of the structure used to facilitate discharge planning it is necessary to involve both hospital and community based personnel to facilitate effective discharge planning[26].

The destination upon discharge can have a significant impact upon timing of discharge, for example, the availability of carers, home and community supports and residential care facilities, all of these are beyond the control of the acute hospital. Arranging and providing information to community services is a complex task as there a multitude of community based services available and these vary from one geographic area to another[27]. Community based services all have different referral processes, admission criteria and resources available to provide care. It can be difficult to navigate the myriad of services and link patients into the system. It is reported that some community services have waiting lists and are unable to mobilise services for a number of days or in some instances weeks and are limited in the number of visits that can be provided, particularly at weekends[24, 28].

Informal carers, family friends and neighbours, who play a key role in maintaining frail older people at home, provide a major component of community care[14]. The discharge of patients back to the care of informal carers is dependent upon the their availability. There is some evidence that "hospital admissions may be increasing as a consequence of the breakdown in social care within the community and the consequent rise in the number of people living alone"[8, p40]. Additionally, patients without social supports are more likely to be admitted to hospital[8]. The link between informal carers and acute admissions demonstrates that there is a fine line between health care and social care in many instances and often a sudden family crisis can become an emergency medical crisis[8]. A family crisis may be precipitated by the constant demand of caring for an elderly person, where residential care is unavailable due to the inadequate number of residential beds and societal expectation of maintaining people in the community.

2.5 Summary

It is undeniable that the ageing population is having a significant impact upon acute hospital resources as demonstrated by increasing demand for acute medical admission and for subacute and residential care beds. Acute hospitals are struggling with balancing demand against available resources. They are searching for efficiency gains, which may be found by concentrating upon improving the quality of care and reducing complications that lead to longer lengths of stay, and/or implementing various initiatives such as clinical practice guidelines. At the same time, the trend towards specialisation in medicine is raising questions regarding the management of patients with multi-system disease including geriatric co-morbidities.

On another dimension, the modelling of bed flow highlights the interaction between factors affecting bed usage and has the potential for driving change by aligning clinical with organisational goals. When considering the situation in Victoria it is important to get an accurate picture of the issues and the extent to which a problem exists, before identifying potential solutions. In particular it is important to focus on best possible outcomes for the patient and to examine the potential for improvements in the system of care. The challenge is to adequately describe medical in-patients, including factors effecting LOS such as psychosocial determinants, and examine the work undertaken by SMUs and GMUs in an effort to identify opportunities for improving performance within the acute sector.

3. Aims and Objectives of Study

3.1 Aims

The overall aims were:

1. To describe the range, type and organisation of services provided at five teaching hospitals for medical in-patients (i.e. non surgical unit admissions);
2. To identify and examine the factors responsible for variation in length of stay (LOS) for medical in-patients between and within hospitals;
3. To describe the characteristics of patients and the care that they receive during a medical in-patient episode of care.

3.2 Specific Objectives

1. Determine whether there were significant differences in LOS for medical in-patient episodes of care across the five hospitals, and to determine whether there were factors identifiable from administrative data sets to explain these variations;
2. Determine whether there were significant differences in LOS for particular Diagnosis Related Groups (DRGs) when general medical (GMU) and specialist medical unit (SMU) management is compared, and to identify factors that might explain variation in LOS between and within hospitals, and between GMU and SMU;
3. Develop a set of performance indicators for medical in-patient episodes;
4. Ensure that the patient and carer (consumer) perspective was addressed in the examination of the process of care and the development of performance indicators
5. Review the workforce structure of medical, nursing and allied health staff caring for medical in-patients

4. Methods

4.1 Study 1: Description of Medical In-patient Management and Activity

A Examination of the characteristics of patients admitted to hospital under medical units and description of each hospital's characteristics for the previous 12 month period including comparative analysis of Top 10 DRGs between specialist and generalist units.

Data collected from the Victorian Admitted Episode Dataset (VAED):

Number of hospital separations both same day and multi-day

Number of separations (by medical unit) identify by:

- Same day episodes
- Emergency admissions
- Demographics of admitted patients
- Demographics of the catchment area for each hospital
- Number of medical patients:
  - DRG
  - LOS
  - Co-morbidities
  - Readmission rate with in 28 days same or other condition, planned and unplanned)
  - Discharge status and destination
  - Proportion of elective and emergency patients (after exclusion of same day patients)
  - Number managed in HITH

Analysis for individual hospital compared

- LOS by DRG
- Discharge destination by DRG and LOS
- Relationship between LOS and co-morbidity (number and type)

- Relationship between discharge destination and co-morbidity
- Relationship between LOS and RR for each DRG
- HITH use by DRG and LOS

Analysis for Top10 DRGs: SMUs and GMUs comparisons of

- Demographics
- Co-morbidities
- LOS
- Discharge destination

B Description of the management structure for the care of medical in-patients

Data collected:

- Number and type GMUs and SMUs
- Staffing levels (exclude non-patient care)
- Patterns of management of medical in-patients
  i. Whether direct triage from ED
  ii. Whether admission policies by DRG
- Access to diagnostic services by unit (SMU and GMU) and DRG
- Role of ancillary departments in management by unit (SMU and GMU) and DRG

C Description of the patient and carer experience of medical in-patient care

Focus groups were conducted on 23rd October (RMH) and 30th October (MMC) with patients and carers in order to identify issues of concern to patients and carers. This ensured that the consumer perspective was not lost in the detailed examination of the process and outcomes of care from the institutional perspective. In identifying current levels of activity and comparison of outcomes of care, across institutions and comparing GMU and SMU care, it is not possible to identify qualitative differences in the perspective of patients and carers. Themes related to care which are of concern to the patient and carers need to be addressed if any changes are to be made to systems of care delivery for chronic medical conditions. Previous work suggests that the areas of concern to medical in-patients are mainly related to transitional care and continuity of care.

4.2 Study 2: Census of Medical In-patients

One day snapshot (cross-sectional study)

This was conducted in order to identify the type of activity involved in medical in-patient management on a day-to-day level. The census was conducted on 30th August at SVH, The Alfred and RMH and on 6th September at MMC and ARMC.

Data collected:

- Number of in-patients
- Managing Unit
- Acuity of admission (emergency/elective)
- Whether one day admission
- Day of stay
- Demographics
- Principal DRG
- Co-morbidities
- Severity of illness
- Nursing care needs
- Functional status
- Cognitive status
- Principal activity that day (diagnosis, treatment, waiting)
- Contact time with allied health on that day

Analysis:

Descriptive analysis used uni-variate statistics to make comparisons by condition, between and within hospitals and between SMUs and GMUs. Appropriate inferential statistical analyses used logistic regression and other techniques to examine differences in findings between hospitals and between GMUs.

4.3 Study 3: Cohort Study

An in-depth study of the process of care for a representative series of patients across the episode of care.

The distribution of admissions between SMUs and GMUs was examined for high volume DRGs at each site. Where there was a discrepancy in the LOS between specialist and GMUs identified as being of concern, 3 agreed conditions (high volume and managed in both SMUs and GMUs) were examined at each site. For each DRG identified according to these criteria, 5 consecutive admissions under each of SMU and GMUs were examined by day of stay across LOS. It was envisaged that a sample of 30 admissions per site would enable meaningful comparisons to be made. The cohort study was conducted between 17th September and 27th October, 2000.

The examination of factors which potentially explain the differences in LOS included patient factors, medical care-related factors and potentially of greater importance, the system of care of such patients. This analysis provided an examination of the process of care on a patient-by-patient level, looking for systematic differences in the process of care between SMU and GMU medical in-patients by day of stay across the episode of care.

At each hospital information was collected from the bedside through an interview with each patient and with staff caring for the patient. Initial information included collection of data on patient demographics, assessment of cognitive, psychological and functional status, social supports and the acuity of presenting condition. Subsequently on a daily basis, the principal activity of patient management was recorded, as was the patient dependency for nursing care and interactions with allied health. Finally, on the day of discharge each patient's discharge functional status and discharge destination will be documented.

Data collected:

1. Patient factors
   - Demographics
     - Age
     - Social support
   - Ethnicity and language
   - Acuity of presentation
   - Cognitive status
   - Functional status

2. Medical and management factors
   - Co-morbidities
   - Severity of illness on presentation using the Duke University Severity of Illness instrument (DUSOI)
   - Managing unit
   - Use of a pathway or guideline
   - Location (specialist or general medical ward)
   - Analysis of activity by day of stay
     - Nursing care dependency
     - Diagnostic test
     - Treatment

3. Workload and workforce parameters
   - Medical staffing levels and workloads by unit
   - Nurse staffing levels by morning shift, level of seniority and use of non-permanent staff
   - Allied Health staffing levels and workloads by department

4.4 Ethics Approval

Ethical approval to conduct this study was sought from, and provided by, the relevant Research and Ethics committee associated with each of the five hospitals.

5. Outcomes from Study 1 - Medical In-patient Management and Activity

5.1 Management Structures supporting care of medical in-patients

Information and data were collected from the five major teaching hospitals in metropolitan Melbourne, namely Austin and Repatriation Medical Centre (ARMC), Monash Medical Centre (MMC), Royal Melbourne Hospital (RMH), St Vincent's Hospital Melbourne (SVH) and The Alfred. The management structure of these hospitals is dependent upon both the philosophy and service profile of each facility. Thus each has a different internal organisational structure which supports the delivery of care to medical in-patients.

The characteristics and casemix profile for medical in-patients for each of the organisations is described in section 5.2.

The results of semi-structured interviews of senior medical administrative and physician staff for each hospital are reported in the following sections. The interviews were conducted between June and October 2000.

The numbers of medical units provided by the five hospitals and included in this study are presented in the table. They vary from 12 (at SVH) to 16 at both MMC and ARMC.

Table 1: Number of General Medical and Specialty Units included in the VAED analysis

	MMC	Alfred	SVH	RMH	ARMC
General Medical Units	2	2	2	4	4
Specialty Units*	14	12	10	10	12

** NB excludes Emergency Department, Psychiatry, Paediatrics, other highly specialised clinical services such as liver, lung, heart and allogenic bone marrow transplant, Cystic Fibrosis and the Victorian Respiratory Support Services & Spinal Unit at ARMC, Sleep Disorders and Subacute care (eg Rehabilitation or Geriatric Evaluation and Management).*

Specialty Medical Units

The specialty medical units, where a patient can be admitted directly to the unit, which were common to the five hospitals include:

- Cardiology
- Endocrinology
- Haematology and Oncology
- Renal Medicine (or Nephrology)
- Rheumatology
- Dermatology
- Gastroenterology
- Neurology
- Respiratory (or Thoracic) Medicine

Other units include:

- Infectious Diseases (all provide an ID service but only 4 of 5 admit patients directly to a stand-alone ID unit)
- Stroke Unit (all provide a stroke service with 4 of 5 admitting patients directly to a stand-alone stroke unit)
- Acute Geriatrics
- Vascular Medicine
- Asthma, Allergy and Clinical Immunology
- Clinical Nutrition
- Toxicology
- Clinical Immunology
- Hypertension

Medical staffing complements provided in full time equivalent (FTE) units for each GMU or SMU include all aspects covered by the individual clinical service such as in-patient, outpatient and diagnostic services. For some hospitals the coverage provided at night and weekends is shared with a number of units and it was not possible to differentiate the amount of FTE which was applicable to the individual unit. Therefore this FTE was not included in the staffing level table for that hospital and is noted with each table.

5.1.1 Monash Medical Centre

Monash Medical Centre provides acute hospital services within the Southern Health Services Network in a 12 clinical program structure that is multi-campus in nature. Thus general medicine as a department is within the clinical program of General Medicine. In addition to the specialty medical services provided by all hospitals, Monash provides specialised units for Infectious Diseases, Acute Geriatrics, Vascular Medicine, Cystic Fibrosis and Clinical Nutrition.

5.1.1.1 Medical Staffing Levels

The medical staffing complement for GMUs and 3 major SMUs are presented in the table below. For GMU in-patient services, consultants were rostered to undertake ward service for a three month period.

Table 2: Medical Staffing (in Full Time Equivalent units) for MMC

Staff Group	General Medicine	Cardiology	Respiratory Medicine	Neurology and Stroke
Senior Medical Staff	1.2	3.5	2.0	2.2
Senior Registrar	0	2	1	1
Junior Registrar	3*	1	1	1
HMO2 or 3	2*	2	1	2
Intern	5			

*Includes night, evening and weekend coverage for general medicine.

5.1.1.2 Entry into Medical Units

Occupancy rates for MMC were stated to be above 99.5%. Senior staff believed that more than 99% of patients admitted to GMUs were unplanned emergency patients.

In ED, patients were referred to the relevant SMU where a patient had not presented before and had a clinical problem related to a single system. Patients who had not been treated at MMC before and who presented with clinical problems which included more than one system were usually referred to GMUs. Patients who have been treated before were usually managed under the unit which treated them previously unless this was inappropriate (eg previous surgical intervention and presented with an acute respiratory illness).

As MMC has an acute geriatric service, many older patients are managed within this unit but there are strict criteria for entry to this service and the remaining older patients were usually referred to the general medical service for management. Entry to the acute geriatric service included patients older than 65 with an acute deterioration in their health status but with potential for improvement.
At the time of the interview, MMC had an Emergency transition ward, where patients (both medical and surgical patients) were admitted from Emergency prior to transfer to other wards in the hospital or discharge home.

There did not appear to be a policy of geographical co-location of patients from units with the exceptions of some highly specialised areas such as Coronary Care.

5.1.1.3 Access to Advanced Level Diagnostic Services

Subjectively, there appeared to be preferential access given to SMUs for technically sophisticated diagnostic tests (eg MRI or echocardiography). Although there were no data to support this, it was perceived that there were slow turnaround times for results from radiological procedures which led to blockages in the system for GMU in-patients. There was also some conflict between the provision of diagnostic services between public and private in-patients from the collocated private hospital. It was thought this preferential access related to the funding stream for the departments providing the services and the control of discretionary budgets.

5.1.1.4 Availability and Use of Support Services

Resources have been committed to provide support to facilitate discharge for patients. These resources included access to an Aged Care services nurse and increased resources to support discharge planning during the in-patient stay of GMU in-patients. In addition, access to Hospital in the Home (HITH) and post acute care (PAC) services is available. On average for the last year, there were 30 medical in-patients per week awaiting placement in supported residential accommodation (eg nursing home or hostel).

5.1.1.5 Service Improvement

All medical units participated in service improvement activities within the clinical program structure of Southern Health. These activities are supported by a small resource allocation. All clinical programs report to the Program Management on monthly quality key performance indicators such as Inlier length of stay (LOS) fraction i.e. the Southern Health Inlier LOS over the State Inlier LOS and Excess Inlier days over the State average LOS. Service improvement activities did not appear to be reported more widely in the Network.

5.1.1.6 Professional Development

Weekly clinical meetings provided access to some in-house professional development but in general consultants were expected to meet their own professional development needs. The general training program provided for training posts and interns supports junior medical staff.

5.1.2 The Alfred

The Alfred has recently implemented a decentralised clinical directorate structure as the organisational model for service delivery. There are 6 in-patient directorates. In this model each directorate has nursing and medical services directors. The general (or internal) medicine service at The Alfred is delivered from the Professorial General Medical Unit (PGMU), which is collocated in a directorate with ED, Renal Medicine and Neurosciences.

In addition to the specialty services provided by all hospitals, The Alfred provides specialised units for Infectious Diseases, Cystic Fibrosis, Asthma, Allergy and Clinical Immunology. It also provides state-wide services for allogenic bone marrow, heart and lung transplantation.

5.1.2.1 Medical Staffing Levels

The medical staffing complement for PGMU and 3 major SMUs are presented in the table below. For the general medicine in-patient service, senior medical staff were rostered to undertake ward service for a three month period. Junior medical staffing levels do not include night or weekend coverage.

Table 3: Medical Staffing (in Full Time Equivalent units) at The Alfred

Staff Group	Internal (General) Medicine	Cardiology	Respiratory Medicine	Neurology and Stroke
Senior Medical Staff	1.5	7.36	6.77	2.46
Senior Registrar	2	3	2	1
Junior Registrar	2	2	0	1
HMO2 or 3	0	1	2	1
Intern	2	1	1	1

5.1.2.2 Entry into Medical Units

Occupancy rates for The Alfred were stated to be 99.3%. Senior staff believed that more than 98% of patients admitted to PGMU were unplanned emergency patients.

In ED, patients were referred to the relevant SMU where a patient had not presented before and had a clinical problem related to a single system. Patients who had not been treated at The Alfred before and who presented with clinical problems which included more than one system were usually referred to the PGMU. If patients are older than 65, and had more social rather than bio-medical issues requiring resolution, they are usually triaged to Caulfield General Medical Centre and the medical staff who have responsibility for the care of these patients' also have admitting rights to PGMU at The Alfred. Patients who had been treated in the

previous 6 months were usually managed under the unit which treated them previously, unless this was inappropriate (eg previous surgical intervention and presented with an acute respiratory illness).

The Alfred has a policy that encourages geographical co-location of patients from the specialised units. There is insufficient space available to allocate all PGMU beds into one ward – therefore PGMU patients are admitted to the next available bed, irrespective of location.

5.1.2.3 Access to Advanced Level Diagnostic Services

Subjectively, there appeared to be no preferential access given to SMUs for technically sophisticated diagnostic tests.

5.1.2.4 Availability and Use of Support Services

PGMU experienced delays in assessment for rehabilitation. There had been a gradual increase in the use of HITH for some patients who would otherwise be admitted or would have remained longer in the ward after admission. On average over the last year, there were 15 patients per week awaiting placement in supported residential accommodation (eg nursing home or hostel).

5.1.2.5 Service Improvement

All medical units participated in service improvement activities, such as clinical audit. Each unit publicly presented one audit per annum to the Division of Medicine. Audit outcomes did not appear to be distributed beyond divisional level.

5.1.2.6 Professional Development of Medical Staff

Weekly clinical meetings provided access to some in-house professional development but in general consultants were expected to meet their own professional development needs. The general training program provided for training posts and interns supports junior medical staff.

5.1.3 St Vincent's Hospital Melbourne

St Vincent's Hospital Melbourne (SVH) has a decentralised directorate structure as the total organisational service delivery model. There are 6 directorates. Three are pre-dominantly in-patient based. In these directorates, there is a clinical nursing director and medical director for each directorate and the clinical directors form part of the hospital's senior executive team. The general medicine services at SVH are part of the Special Medicine directorate which also incorporates most of the other specialty medical services including neurosciences.

In addition to the specialty services provided by all hospitals, SVH has a Stroke Unit. At SVH, the Infectious Diseases (ID) physicians form part of the general medicine services and have identifiable ID in-patients cared for as part of the general medical unit structure.

5.1.3.1 Medical Staffing Levels

The medical staffing complement for GMUs and 3 major SMUs are presented in the table below. The staffing levels include night and weekend coverage.

Table 4: Medical Staffing (in Full Time Equivalent units) at SVH

Staff Group	General Medicine	Cardiology	Respiratory Medicine	Neurology and Stroke
Senior Medical Staff	2.4	3.4	1.5	2.4
Senior Registrar	1	2	1	1
Junior Registrar	3	1	0	1
HMO2 or 3	1	1	0.5	1
Intern	4	3	0	0

5.1.3.2 Entry into Medical Units

Occupancy rates for SVH were stated to be above 100%. The perception was that more than 95% of patients admitted to GMUs were unplanned emergency patients.

In the ED, patients were referred to the relevant SMU where a patient had not presented before and had a clinical problem related to a single system. Patients who have not been treated at SVH before and who presented with clinical problems which included more than one system are usually referred to the GMUs. Patients who had been treated in the previous 6 months were usually managed under the unit which treated them previously, unless this was inappropriate (eg previous surgical intervention and presented with an acute respiratory illness).

A short stay ward (Emergency Medical Unit – EMU) was implemented at SVH in 2000. Patients are admitted from ED to this area for 48 hours. Thereafter, the policy is that patients are either transferred to the home unit's beds, to HITH or discharged home. Physicians from ED and GMU jointly manage this unit. There was one senior level resident medical officer (HMO3) allocated to provide junior medical staff support for this unit.

There is a policy of geographical co-location of patient beds for each directorate at SVH and it was stated this was generally adhered to. This did involve movement of patients at times and the directorate nursing staff have responsibility for managing this process.

5.1.3.3 Access to Advanced Level Diagnostic Services

Subjectively, there appeared to be no preferential access given to the SMUs for technically sophisticated diagnostic tests.

5.1.3.4 Availability and Use of Support Services

There is a full time geriatrician on-site at SVH which has greatly facilitated the assessment process for access to subacute services. The senior staff stated that there was ready access to HITH and PAC services and that these services were both used by GMUs. On average over the last year, there were 13 patients per week awaiting placement in supported residential accommodation (eg nursing home or hostel).

5.1.3.5 Service Improvement

All medical units participated in service improvement activities, such as quality meetings and clinical audit. One session per week of senior medical staff time has been allocated within SVH to ensure senior medical staff involvement in hospital wide quality and clinical performance activities.

Recently the directorate reviewed the GMU service and changes to its internal structure were recommended and implemented. This led to re-organisation of GMUs and the subsequent appointment of a senior GMU registrar, a position that is non-rotational and provides senior level medical support for all GMU junior staff.

A 30 minute report meeting is held at 8.00 am daily for the GMUs where the covering night registrar provides a clinical report on newly admitted patients or on GMU patients whose clinical status deteriorated overnight. This meeting is attended by the senior medical staff rostered onto ward service on that day and is instrumental in developing the overall treatment approach for patient care.

A further 30 minute daily meeting of the GMU multidisciplinary team reviews discharge planning and patient progress. This has been instrumental in ensuring early identification and discussion of any potential problems with timely discharge. Each of the allied health disciplines used statistical systems and have implemented performance indicators from those systems which have been used to review the timeliness of response to patient needs. This information had been retained within each allied health department and reported to the hospital-wide Patient Care Review Committee but the departments have been developing a system to enable regular reporting of this type of data to be feedback directly to clinical units.

In GMU, there is a quality service plan which is part of the overall organisation's quality structure. Outcomes from regular and adhoc clinical audits were reported to the Division of Medicine and the Hospital's quality manager for presentation to the monthly Patient Care Review Committee.

5.1.3.6 Professional Development of Medical Staff

Although in general the senior medical staff were expected to meet their own professional development needs, weekly clinical meetings provided access to some in-house professional development. The weekly meeting was a formal post-graduate continuing education meeting for physicians and registrars and used a case presentation format. It was conducted jointly with the SMUs whereby the GMU staff presented 2 out of 3 weeks and the third week was presented by the SMU staff. The general training program provided for training posts and interns supports junior medical staff. One of the key responsibilities of the senior medical registrar in general medicine was to provide regular intern training sessions which had improved the level of training and supervision offered to these staff.

5.1.4 Royal Melbourne Hospital

Royal Melbourne Hospital (RMH) has a clinical directorate structure as the organisational model for service delivery. Each directorate has a nurse operations director and a medical clinical director. These staff form part of the senior executive team for RMH. General medicine at RMH is located in the directorate of General Medical Services which also includes Thoracic Medicine, the Victorian Infectious Diseases Service and Clinical Pharmacology. Other specialty medical services are located in the Specialist Medicine directorate.

In addition to the specialty services provided by all hospitals, RMH provides specialised units for Infectious Diseases and Allogenic Bone Marrow Transplants. All patients admitted with a stroke are automatically referred to the stroke service, although the patients are admitted to either Neurology or General Medicine.

5.1.4.1 Medical Staffing Levels

The medical staffing complement for GMUs and 3 major SMUs are presented in the table below. The staffing levels for junior medical staff include coverage for nights and weekends.

Table 5: Medical Staffing (in Full Time Equivalent units) at RMH

Staff Group	General Medicine	Cardiology	Respiratory Medicine	Neurology and Stroke
Senior Medical Staff	3.0	7.3	1.4	3.7
Senior Registrar	0	5*		
Junior Registrar	5.5	1	1	2
HMO2 or 3	0	6		4
Intern	11		0.5	

**includes 3 Fellows in Cardiology*

5.1.4.2 Entry into Medical Units

Occupancy rates for RMH were stated to be over 99%. It was the perception of the senior staff interviewed that more than 94% of patients admitted to GMUs were unplanned emergency patients.

The stated policy for patient referral from ED is to have patients admitted to general units except in a few specified circumstances for severe acute illness. However in practice, ED usually refers patients to the relevant specialist unit where a patient has not presented before and has a clinical problem related to a single system. Patients who have been previously admitted at RMH are usually managed under the unit which treated them previously unless this was inappropriate (eg previous surgical intervention and presented with an acute respiratory illness).

Geographical co-location of patients in general medicine is encouraged but there is insufficient allocation of beds to each of the medical units. Therefore patients are usually allocated to the next available bed which may be located anywhere in the hospital.

5.1.4.3 Access to Advanced Level Diagnostic Services

Subjectively, there appeared to be preferential access given to the SMUs for technically sophisticated diagnostic tests within their own areas, but there were no measurements of performance to substantiate this perception.

5.1.4.4 Availability and Use of Support Services

There were significant delays in assessment for subacute services, particularly in the aged care assessment area – these delays had become increasingly evident in the last 12 months. There has been a gradual increase in the use of HITH for some of the patients who would otherwise be admitted or would have remained longer in the ward after admission. There were between 20 and 30 patients per week awaiting placement in supported residential accommodation (eg nursing home or hostel) during 1999/2000.

5.1.4.5 Service Improvement

All medical units participate in service improvement activities, such as clinical audit. The general medicine units also actively participate in the monthly Division of Medicine audit meetings. Outcomes from these meetings did not appear to be reported more widely in the organisation.

5.1.4.6 Professional Development of Medical Staff

There has been a concerted effort made to support the professional development of senior medical staff. In particular a monthly continuing education program held at 5.30pm has been developed which is evidence-based and interactive. The general training program provided for training posts and interns supports junior medical staff.

5.1.5 Austin and Repatriation Medical Centre

The organisational model established at the ARMC has a decentralised structure with large clinical business unit (called clinical services units - CSUs). This model is established across both the Austin and Repatriation sites. In relation to the delivery of medical patient care, services are provided from 4 CSUs, each of which have a medical director and an operational manager. Overlaying this operational structure is a professional divisional structure.

Specialised state-wide services provided at ARMC include the Victorian Spinal Injury Service, Victorian Respiratory Support Services and the Liver Transplant Services. In addition to the specialty services provided by all other hospitals, ARMC provides unit based clinical services for Stroke, Toxicology, Acute Geriatrics and Hypertension.

A new medical service, which has been in operation since June 2000, is the medical assessment and planning unit (MAPU). This is a short stay ward (for 48 hours) where all multidisciplinary services are concentrated to enable rapid clinical assessment and organisation of appropriate services to both facilitate patient recovery and ensure timely discharge.

5.1.5.1 Medical Staffing Levels

The medical staffing complement for GMUs and 3 major SMUs are presented in the table below. The staffing levels for junior medical staff include night and weekend coverage.

Table 6: Medical Staffing (in Full Time Equivalent units) at ARMC

Staff Group	General Medicine	Cardiology	Respiratory Medicine	Neurology and Stroke
Senior Medical Staff	4.2	4.5	4.15	5.15
Senior Registrar	0	4	3	2
Junior Registrar	4.0	0	0	1
HMO2 or 3	0	3	2.5	2
Intern	8.0	0	0	0

5.1.5.2 Entry into Medical Units

Occupancy rates for ARMC were stated to be over 99%. The senior staff interviewed stated that more than 95% of patients admitted to GMUs were unplanned emergency patients.

At ARMC, it was stated that the senior consultant in ED decides which unit new patients are referred to for ongoing care. Patients, who have been treated at ARMC in the previous 6 months, are managed by the unit

who had responsibility for their care on the last occasion unless this is inappropriate (eg previous surgical intervention and presented with an acute respiratory illness).

Geographical co-location of patients in GMUs is encouraged with 2 wards specifically allocated to accept these patients.

5.1.5.3 Access to Advanced Level Diagnostic Services

A policy has been established to enable priority access to sophisticated diagnostic testing procedures for patients in MAPU to assist with rapid clinical decision making about patient care. There was no perception of lack of access to diagnostic services for other GMU patients.

5.1.5.4 Availability and Use of Support Services

Residential placement assessment for aged care were completed in a timely manner but there was a significant problem with locating suitable accommodation to which the patients could be discharged. On average in the last 12 months, there were 32 patients per week awaiting placement in aged residential accommodation (eg nursing home or hostel).

There has been a gradual increase in the use of HITH for some patient conditions, more particularly in the SMUs. A Hospital in the Nursing Home service has also contributed to managing patients in their own environment rather than admitting them hospital.

5.1.5.5 Service Improvement

All medical units participated in service improvement activities, such as clinical audit and case review. The general medicine units also actively participated in the Division of Medicine weekly and bi-monthly grand rounds. Clinical audits were conducted within all units on a weekly basis. A new framework for organisation-wide quality improvement activities was under development at ARMC.

The introduction of the MAPU was in response to a need for service improvement in GMU. The MAPU has a policy of conducting daily multidisciplinary ward rounds to assist with communication about patient progress and facilitate planning for patient management.

5.1.5.6 Professional Development of Medical Staff

Senior medical staff were generally responsible for their own professional development. Notification of conferences and training opportunities were e-mailed to senior medical staff. There is a plan underway which will develop clinical manager training opportunities for senior staff. The general training program for training posts and interns provides support for junior medical staff.

5.1.6 Summary

All hospitals have developed different organisational structures to support the delivery of patient care. However, all have implemented decentralised structures whereby the hospitals' core activities are divided into sections, frequently called directorates. MMC (as part of Southern Health) and ARMC have programs or business units reaching across multiple sites. All clinical programs, directorates or business units have senior clinical staff, especially medical staff, involved at the top level of management. The mechanisms for ensuring communication about clinical outcomes and activities between the senior hospital administrators and the clinical sections were in place to a varying degree. Service improvement activities for the most part appeared to be adhoc with little connection between clinical and organisational goals.

It is evident that less experienced junior medical staff were rostered to cover the patient workload for GMUs in comparison to SMUs. This was so for both registrar and junior resident medical officers, where only interns were rostered to GMUs whereas very few SMUs have interns rostered to work within their units.

Each of the hospitals' senior managers stated that their hospitals had occupancy levels above 99%. This compares unfavourably with the level of 85% from studies on modelling for optimal bed utilisation[6]. At each hospital the weekly average number of patients waiting for a residential placement ranged from 13 – 32. If this finding was replicated through all public hospitals in the metropolitan area, there would be a great need for increased access to, or availability of, supported residential accommodation.

5.2 Hospital and Patient Characteristics in 1999/2000

5.2.1 Demographics for each hospital's catchment area

The acute hospital separations for 1998/99 were used to develop a notional catchment using Statistical Local Areas (SLA)[29] for each of the hospitals. The separations were summarised by SLA and from this an arbitrary figure of 5% was used to develop the notional catchment area for each hospital. Consequently, there was variability between the hospitals to the degree with which this represented their patient population.

ARMC provided more than 60% of its services for people from the local area, whereas at SVH, this was only 23% of the total throughput. For The Alfred, MMC and RMH, 36%, 43% and 42% respectively of separations where for people coming from their local areas.

Data Sources
The data sources used to develop a profile of the population in the notional catchments for each hospital included:

- The Australian Bureau of Statistics 1996 Census, (Cdata 1996)
- The Victorian Government Department of Infrastructure (DOI) - "Victoria in future 2000"
- The Australian Bureau of Statistics Population by Age by Sex Victoria Cat. no. 3235.2 1998
- The Victorian In-patient Minimum Data Set 1998-1999.

The Index of Relative Socio-Economic Disadvantage (IRSED) was derived from attributes such as low income, low educational attainment, high unemployment and jobs in relatively unskilled occupations. The lower the IRSED score the higher the level of disadvantage in comparison to other areas.

In the following section, population data are presented by 3 age groups, 0-14 years, 20-39 years and 70 years and over. The comparative rates for metropolitan Melbourne for these are groups are 19.6%, 32.7% and 8.4% respectively.

5.2.1.1 The Alfred

The Alfred provided acute public hospital care to patients from 391 different SLAs across Victoria and interstate. This care included 45,995 acute public separations for 1998 - 99 (VIMD 98-99). Of the total acute public separations, 36.1% came from four SLAs.

They were

- Port Phillip - St. Kilda (11%)
- Glen Eira – Caulfield (10.8%)
- Stonnington –Prahran (9.1%)
- Stonnington – Malvern (15%)

The major catchment of The Alfred remains largely unchanged from that reported in 1995 in the Metropolitan Hospitals Planning Board (MHPB) Report[30].

Population Data:

- All of the 4 SLAs have projected growth rates of between 3.8% and 7.7% for the period 1999 to 2016, which are less than metropolitan Melbourne which has a projected growth rate of 13.4% for the same period.
- The comparative population data for these 4 SLAs were:
  0-14 age groups - 12.6%;
  20-39 age groups - 40.4%;
  70+ age groups - 10.8%.
- The gender distribution by age for these 4 SLAs indicated there were more females than males in the 70+ age groups which is consistent with overall population data. There were no significant differences in the distribution of men and women in the younger age groups.

Socio-economic Status - IRSED
Average IRSED for these 4 SLAs was 1084.5, indicating a relatively advantaged population compared to metropolitan Melbourne (1025) and Victoria as whole (1016).

Country of Birth
Sixteen percent of the populations in these SLAs were born outside Australia, where the overall rate for Melbourne is 22.3%.

5.2.1.2 Austin and Repatriation Medical Centre

Austin and Repatriation Medical Centre provided acute public hospital care to patients from 320 different SLAs across Victoria and interstate in 1998/1999. During that period ARMC provided 45,389 acute public separations. More than 5% of the separations came from 6 SLAs which together provided 61.2% of the total acute public separations. They were

- Banyule – Heidelberg (15%)
- Whittlesea – South (12%)
- Darebin – Preston (12%)
- Banyule – North (8%)
- Manningham – West (7%)
- Darebin – Northcote (7%)

The major catchment of ARMC remained largely unchanged from the 1995 MHPB Report[30].

Population Data:

- For the period 1999 to 2016, the 6 SLAs have projected growth rates between 2.6% and 6.7%. All are less than the projected growth rate of 13.4% for metropolitan Melbourne.
- The population data in these 6 SLAs were:
  0-14 groups - 18.3%;
  20-39 age groups - 33%;
  70+ age groups - 8.5%.
- The gender distribution by age for these 6 SLAs indicated a much larger proportion of females to males in the 70+ group.
- In the early age groups, there were consistently more males than females from 0-30 years. After age 30, there were consistently more females than males.

Socio-economic Status - IRSED
Average IRSED for the 6 SLAs was 1016.3 closely matching that of Victoria's (1016) but was slightly disadvantaged when compared to metropolitan Melbourne (1025).

Country of Birth
People born outside Australia represented an average of 22.8% of the population for the 6 SLAs – again close to the average for metropolitan Melbourne (22.3%).

5.2.1.3 Monash Medical Centre

Monash Medical Centre (MMC) provided acute public hospital care to patients from 286 different SLAs from Victoria and interstate and 44,323 acute public hospital separations in 1998 - 99. Of the total acute public hospital separations, 43.1% were for people from five SLAs, which were:

- Kingston – North (11.3%)
- Greater Dandenong – Balance (11%)
- Monash - South West (8.6%)
- Glen Eira – South (6.3%)
- Monash - Waverley East (5.9%)

The major catchment of MMC remains largely unchanged from the 1995 MHPB Report[30].

Population Data:

- For the period 1999 to 2016, the 5 SLAs have projected growth rates between 1.7% and 8.1%, which are less than metropolitan Melbourne has at 13.4%.

- The population data in these 5 SLAs were:
  0-14 age groups - 17.1%;
  20-39 age groups - 30.9%;
  70+ age groups - 9.8%.

- The gender distribution by age for these 5 SLAs indicated there were more females than males in the 70+ age groups, which is consistent with the longer life span of women. There were no significant differences in the distribution of men and women in the younger age groups.

Socio-economic Status - IRSED
Average IRSED for the 5 SLAs was 1017.2, indicating a similarity to Victoria as whole (1016) but slightly disadvantaged when compared to metropolitan Melbourne (1025).

Country of Birth
People born outside Australia represented an average of 24.4% of the population for the 5 SLAs. This was slightly higher than for metropolitan Melbourne (22.3%)

5.2.1.4 Royal Melbourne Hospital

Royal Melbourne Hospital provided acute public care to patients from 400 different SLAs across Victoria and interstate and 60,100 acute public separations in 1998 - 99. Of the total acute public separations 41.6% came from 5 SLAs which were.

- Moonee Valley – Essendon (10.7%)
- Hume – Broadmeadows (9.4%)
- Moreland – Brunswick (8.0%)
- Moreland – Coburg (7%)
- Moreland – North (6.5%)

The major catchment of RMH has narrowed to the North Western corridor since the opening of the Northern Hospital and Sunshine Hospitals and is different from that previously reported in the MHPB Report[30].

Population Data:

- 4 of the 5 SLAs show growth rates of between 4.5 and 8.4% between 1999 and 2016, these are less than metropolitan Melbourne with a projected growth rate of 13.4% for the same time period. One SLA has a population decline of 4% for the same time period.
- The population of the 5 SLAs in comparison to metropolitan Melbourne were:
  0-14 age groups - 18.5%;
  20-39 age groups - 35.2%;
  70+ age groups - 10.5%.
- The age distribution by gender for the 5 SLAs indicated there were more females than males in the 70+ age groups which is consistent with the longer life span of women. There was no significant difference in the distribution of men and women in the younger age groups.

Socio-economic Status – IRSED
Average IRSED for these 5 SLAs is 959.4, indicating a relatively disadvantaged population compared to metropolitan Melbourne (1025) and Victoria as whole (1016).

Country of Birth
People born outside Australia represented an average of 28.5% of the population for these 5 SLAs. This is higher than for metropolitan Melbourne (22.3%).

5.2.1.5 St. Vincent's Hospital

St. Vincent's Hospital provided acute public hospital care to patients from 330 different SLAs from Victoria and interstate and 36,225 acute public separations in 1998 - 99. Of the total acute public separations, only 23.1% came from 3 SLAs but no other SLA reached the threshold level of 5%. The three SLAs were

- Yarra – North (10.7%)
- Darebin – Northcote (7.1%)
- Yarra – Richmond (5.4%)

The major catchment of SVH remains largely unchanged from the 1995 MHPB Report[30].

Population Data:

- The 3 SLAs have projected growth rates of between 5.1% and 9.2% between 1999 and 2016 which is less than metropolitan Melbourne's projected growth rate of 13.4% for the same time period.

- The population data in these 3 SLAs were:
  0-14 age groups - 13 %;
  20-39 age groups - 46.6%;
  70+ age groups - 8.3%.
- The gender distribution by age for the 3 SLAs indicated there was a much higher proportion of females than males in the 70+ age group. There were few differences in the distribution of males and females in the age groups below 19. There were more females than males between 20 – 34 and thereafter there was a similar distribution between the genders up to age 70.

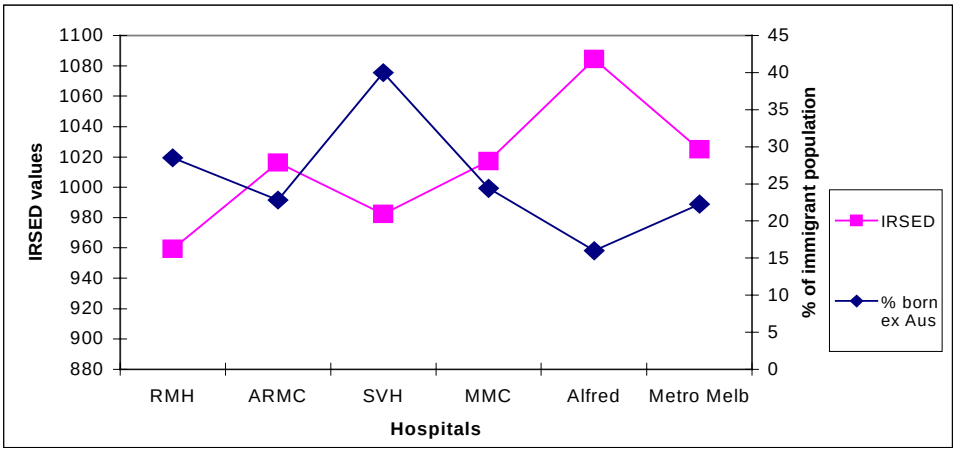
Socio-economic Status - IRSED
Average IRSED for the 3 SLAs was 982.3, indicating a disadvantaged population compared to Victoria as whole (1016) and even more so with metropolitan Melbourne (1025).

Country of Birth
People born outside Australia represented an average of 40% of the population for these 3 SLAs. This was much higher than for metropolitan Melbourne (22.3 %).

5.2.1.6 Comparisons between Hospitals

From this data, the major comparisons between hospitals are on IRSED levels and on proportions of people born outside Australia. Both provide an indication of the socio-economic circumstances for each hospital's specified catchments. The IRSED was lower for the catchment areas for RMH and SVH and the proportion of people in the local catchments born outside Australia was higher for SVH and RMH.

Figure 1: Comparison between hospitals on the Index of Relative Socio-Economic Disadvantage and proportion of people born outside Australia



5.3 Aged Residential Care

The Commonwealth Department of Health and Aged Care has developed a planning framework to distribute residential care places according to population planning ratios. The population planning ratio is 40 residential places for high care, 50 for low care and 10 for community aged care packages per 1000 people aged 70 or over in each health regions of the Victorian Department of Human Services[31]. Each region encompasses a number of local government areas (LGAs).

The Commonwealth funded aged residential care places for both high and low care for each of the LGAs associated with the five hospitals is presented in the following table. Access to some LGAs is shared by 2 hospitals – notably SVH and ARMC in Darebin and The Alfred and MMC in Glen Eira. In the following table, the actual beds for high and low care are presented, as are the beds required through using the planning framework previously outlined. For each hospitals' main catchment areas, and predicated on this planning framework, there is a shortage of currently available residential places. Other adjacent areas may assist with meeting some of the additional needs but within the overall metropolitan area, there was an under supply of aged residential care places in November 2000.

Table 7: Benchmark and Actual Residential Accommodation by LGA

	LGA	Estimated pop. aged 70+ (2000)*	High Care Benchmark (30/9/00)#	High Care Current (4/11/00)§	Low Care Benchmark (30/9/00)#	Low Care Current (4/11/00)§	Total Benchmark#	Total Current§
RMH	Hume	4,952	198	169	248	243	446	412
	Moreland	15,983	639	538	799	352	1438	917
	Moonee Valley	11,743	470	366	587	340	1057	736
ARMC	Banyule	12,180	487	563	609	502	1096	1040
	Darebin	14,943	598	576	747	518	1345	1091
	Whittlesea	5,184	207	270	259	121	467	376
	Manningham	8,720	349	190	436	209	785	399
SVH	Yarra	4,660	186	219	233	286	419	505
	Darebin	14,943	598	576	747	518	1345	1091
MMC	Monash	15,817	633	572	791	600	1424	1147
	Glen Eira	16529	661	661	826	149	1488	1227
	Greater Dandenong	11,017	441	321	551	363	992	713
	Kingston	14,660	586	727	733	593	1319	1320
Alfred	Port Phillip	7,108	284	397	355	425	640	822
	Stonnington	9,493	380	323	475	360	854	683
	Glen Eira	16529	661	661	826	149	1488	1227
Sub totals$		152,989	6119	5892	7650	5448	13770	11340
All other metro.		145,125	5806	6096	7257	6471	13061	12519
Total		298,114	11925	11988	14906	11919	26831	23907

** Derived from ABS, SLA population projections 1996-2017 (unpublished data) as given in Residential and Community Aged Care Places – 30 September 2000, provided by Commonwealth Department of Health and Aged Care, January 2001.*
 # Derived from column 1 using Commonwealth residential aged care planning ratios.
§Current figures do not include places which have been provisionally allocated by the Commonwealth, places approved to move in or out of the relevant LGAs due to relocation or places which are known to be temporarily unavailable.
$ Subtotals include only one of the entries for Glen Eira and Darebin

When the availability of aged residential places by the aggregated catchments was considered, there was a small oversupply of high care beds in the catchment for SVH and Alfred and a large deficit for RMH. There was an under supply of low care places for all catchments – this persisted even when the high care oversupply was deducted from the deficit.

Table 8: Availability of Aged Residential Care for the catchment areas of each hospital

	High Care deficit	% of total high care actual	Low Care deficit	% of total low care actual
RMH	234	2.0	699	5.86
ARMC	42	0.4	701	5.88
SVH	-11	-0.1	176	1.48
MMC	40	0.3	809	6.79
Alfred	-56	-0.5	335	2.81

5.4 Informal Carer Index

Over the last decade, there has been an increased emphasis within most Western societies including Australia, on keeping people at home as long as it is possible to safely support them in this environment. An important support structure in enabling this is a network of people, family, friends or neighbours who provide informal care[14]. However with the changes in our society, specifically the movement of women back into the

workforce and the declining number of people in the younger age groups, the availability of informal carers is likely to be greatly reduced over the next 50 years.

In the USA, a carer index was developed from the number of people aged 50 –64 compared to the number of people aged 85 or more[32]. The index demonstrated that in 1990 there were 11 potential carers for every person aged 85 or more. By 2010 it had reduced to 10 carers, by 2030 to 6 carers and by 2050 it was predicted that there would be only 4 potential carers per person aged 85 or more.

A similar approach was taken to review the potential availability of informal carers over the next 15 years within the Melbourne population and specifically for the catchment LGAs for the 5 hospitals. The age range chosen for the potential carers was 45 – 59 years and compared to the population aged 80 years or more. From the data it can be seen that the levels of carers available are low in comparison to the USA data, despite the differences in the chosen age groups.

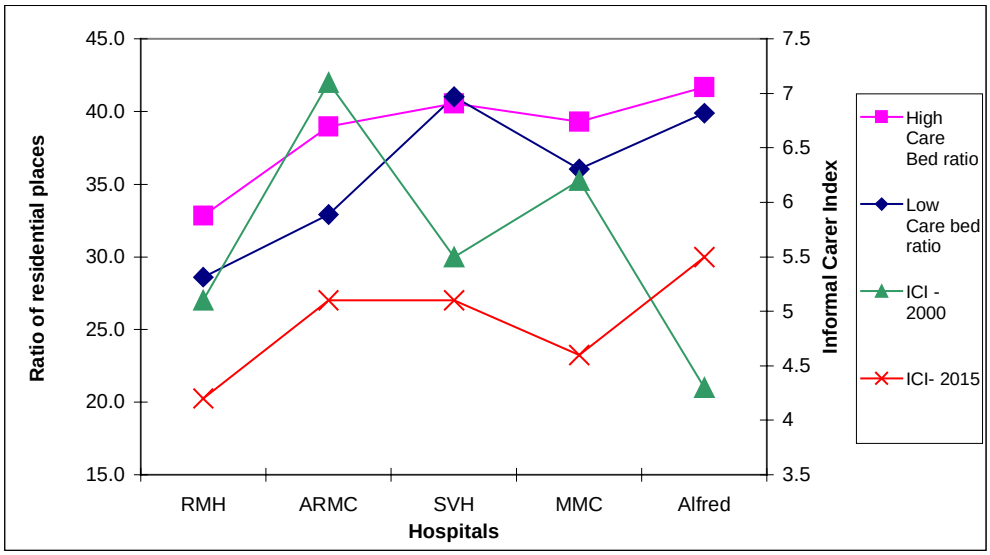
Table 9: Informal Carer Index for period 2000 - 2015

		Carer Index			
Statistical Local Areas	Associated Hospital	2000	2005	2010	2015
Glen Eira (C) - Caulfield	Alfred	3.9	4.2	4.5	5.0
Port Phillip (C) - St Kilda	Alfred	4.3	4.9	5.3	6.2
Stonnington (C) - Malvern	Alfred	5.1	5.6	5.7	6.0
Stonnington (C) - Prahran	Alfred	4.6	5.1	5.2	5.6
Banyule (C) - Heidelberg	ARMC	4.1	3.7	3.6	3.6
Banyule (C) - North	ARMC	11.1	8.6	6.9	6.2
Darebin (C) - Preston	ARMC	4.3	3.9	3.7	3.9
Manningham (C) - West	ARMC	9.2	7.4	5.9	5.2
Whittlesea (C) - South	ARMC	19.5	15.9	12.3	9.5
Darebin (C) - Northcote	ARMC, SVH	4.6	4.7	4.8	4.6
Glen Eira (C) - South	MMC	4.4	4.2	4.2	4.7
Gr. Dandenong (C) Bal	MMC	7.9	6.3	5.3	4.9
Kingston (C) - North	MMC	5.4	4.8	4.5	4.6
Monash (C) - South-West	MMC	4.2	3.8	3.6	3.6
Monash (C) - Waverley East	MMC	10.3	7.3	5.5	4.8
Hume (C) - Broadmeadows	RMH	19.3	13.6	10.7	9.0
Moonee Valley (C) - Essendon	RMH	3.7	3.7	3.7	3.8
Moreland (C) - Brunswick	RMH	5.3	5.3	5	5.0
Moreland (C) - Coburg	RMH	3.8	3.5	3.5	3.8
Moreland (C) - North	RMH	4.1	3.1	2.7	2.7
Yarra (C) - North	SVH	6	5.4	4.9	4.7
Yarra (C) - Richmond	SVH	7.6	8.3	8.2	8.6
All Metropolitan Melbourne		6.5	6	5.5	5.4

The result of matching the aged residential care availability (by use of a ratio of places to 1000 population aged 70 or more) with the informal carer index is illustrated in the next figure.

It can be seen that RMH has both a low level of potential informal carer availability and the lowest level of residential care places. The only hospital with a projected increase in carer availability is The Alfred.

Figure 2: Availability of residential care compared to the informal carer index for 2000 and 2015



5.5 Summary

Each of the hospitals have an under supply of aged residential care places in their immediate surrounding community. The magnitude of the deficit varies greatly between hospitals with RMH having less availability for both high and low care than any of the other centres. Both SVH and The Alfred have a small oversupply of high care bed availability in their catchments. However the greatest areas of under supply are in low care accommodation levels. Large deficits exist for RMH, MMC and ARMC.

The inner city hospitals, RMH and SVH have indicators of poorer socio-economic levels within their catchment areas, which may also impact on the ability of people with chronic conditions to manage at home.

The opportunity for patients to go home and continue convalescence and recovery from illness in their own home is reflected in the availability of personal networks and social support. An informal carer index has been developed to provide a surrogate measure of potential availability of community based support. This demonstrated that the level of potential support in the community was not high and that RMH has the lowest levels of potential availability. Only one hospital, The Alfred, had a projected increase in this level of support over the next 15 years.

Each hospital has a large source of clientele from areas other than those geographically close to it. This will have implications for discharge planning and ease of its implementation, especially for arrangement of ongoing support after discharge.

5.6 Victorian Admitted Episode Dataset (VAED)

Each hospital was requested to supply the following datasets from their VAED.

1. Number of separations - care type 4 (total for hospital in 1999/2000)
2. Percentage of these separations which were same day.
3. Identify separations by Medical Units and identify proportion of same day separations
4. From the multi-day separations:
   - Demographics - Age, Sex, Postcode
   - Co-morbidities - all diagnosis codes listed for the admission
   - Readmission rate within 28 days (planned and unplanned)
   - Discharge status and destination (separation type)
   - Discharge unit
   - Proportion of elective and emergency patients through use of admission type
   - Admission and Discharge Dates
   - LOS
   - Number managed in HITH

Some of the datasets did not include all information and it was not easily retrievable from those sites where data were missing. Therefore the following section reports the information which was made available from each site.

Standard definitions of care types are used for the Victorian Admitted Episode Dataset (VAED)[33]. For patients admitted to hospital in Victoria, there are a number of care types defined for inclusion in the VAED. The care type of interest to this study was the one designated as "Acute Care and Day Surgery including qualified newborn". The definition of "acute care type" refers to an admitted patient episode that does not meet the criteria of classification as any other care type[33]. This is coded in the VAED as Care Type 4[33].

From the National Health Data Dictionary, an episode of care is described as a phase of treatment. The description of an acute episode of care is as follows:

> "An episode of acute care for an admitted patient is one in which the principal clinical intent is one or more of the following:
> - to manage labour (obstetric);
> - to cure illness or provide definitive treatment of injury;
> - to perform surgery;
> - to relieve symptoms of illness or injury (excluding palliative care);
> - to reduce severity of an illness or injury;
> - to protect against exacerbation and/or complication of an illness and/or injury which could threaten life or normal function; and/or
> - to perform diagnostic or therapeutic procedures."[34]

In the following table, the Acute Care Type 4 episodes of care are listed for the each hospital and then for each hospital's Medical Units excluding separations from ED, Psychiatric units, Maternity Services and Paediatric services (all children 13 years or younger). It should be noted that the Medical Unit same day separations include both renal dialysis and chemotherapy.

Table 10: Acute Care Separations for each hospital in 1999/2000

	Alfred	ARMC	MMC	RMH	SVH
Total Acute Care separations	45813	63784	47806	41078	39081
Total hospital Same Day separations	26663	41853	22352	18786	22869
Sub total – multi-day separations	19150	21931	25454	22292	16212
Multi-day Separations All Medical Units	9193	11202	6920	11637	6653
All MU multi-day seps as % of total multi-day seps	48%	51%	27%	52%	41%
GMU multi-day seps	1311	3585	1082	4002	2325
GMU multi-day seps as % of total MU m/day seps	14%	32%	16%	34%	35%
Same Day Separations for Medical Units	22465	32745	6967*	10089	16059
Total Medical Unit seps	32658	43956	13887	21726	22712
Same Day seps as %of total MU seps	69%	75%	50%	46%	71%

** no sameday chemotherapy provided at MMC and satellite renal dialysis separations for MMC not included*

The remaining dataset of 45,608 separations were analysed using comparisons of GMU and SMU separations. Only patients discharged from a unit described by each specific organisation as a GMU were included in the GMUs separations and all others were included in the SMUs. Acute geriatric separations were included in the SMU group. The GMU separations represented 27% of the total medical unit separations at the 5 hospitals.

Admissions were predominantly classified as emergency for GMUs (91% - 98%) with an overall rate of 95%, whereas for the SMUs a much lower proportion of patients were admitted as an emergency – overall 56% with a range from 45% to 76%.

A small number of separations had a "statistical" classification that indicated that a change in care type had occurred during the admission. The most common change was to Nursing Home Care Type but some were

changed to Psychiatric Care Types. The patients with a statistical admission were not included in the proportional descriptions in the table below but have been reported for completeness.

In the tables in the following sections, the general medical units have been designated as GM and specialty units as SM.

Table 11: Type of Admission for Medical Unit patients in 1999/2000

		Emergency (n)	Elective (planned) (n)	% Emergency Separations	Statistical (n)
Alfred	GM	1276	26	98	9
	SM	4583	3290	58	9
ARMC	GM	3333	221	94	31
	SM	3408	4106	45	103
MMC	GM	1069	12	99	1
	SM	4479	1284	77	75
RMH	GM	3886	115	97	1
	SM	4453	3181	58	1
SVH	GM	2121	204	91	0
	SM	1944	2384	45	0
All	GM	11685	578	95	42
	SM	18867	14245	57	188

5.6.1 Patient Demographics

Data were not uniformly available on postcode and analysis of this has been omitted. Two hospitals initially did not supply data on gender. One was able to supply this in a supplementary file but the other (The Alfred) could not.

5.6.1.1 Patient Age

In the following table, it can be seen that all of the GMUs are responsible for the care of an older age group. Only SVH had an average age group which was below 65 years for the GMU, however this was still older on average than any of the SMUs.

Table 12: Age Distribution across units and hospitals in 1999/2000

	Alfred		ARMC		MMC		RMH		SVH		All	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Mean	69	55.3	72.3	59.2	69.6	56.9	71.8	55.7	64.6	57.1	70.1	56.8
Median	74	57	77	62	75	60	75	58	70	59	75	59
SD	19.7	18.4	16.4	17.2	18.8	19.6	15.9	17.5	19.4	17.3	17.7	18.1

When analysed using a Student's t test for independent groups, the GMU separations were statistically significantly ($p < 0.00005$) older than the SMU separations in each hospital. The same statistically significant difference ($p < 0.00005$) was seen when all separations for GMU and SMU were combined, with the GMU patients being significantly older.

5.6.1.2 Gender

Unfortunately The Alfred was unable to supply gender data in association with the unit based information. When the distribution of the gender of patients from the other hospitals was reviewed, it was apparent that at 3 of the 4 (not at MMC) there was a slightly higher proportion of males in GMUs and this held true for SMUs at all hospitals. A similar finding of a higher number of male separations was demonstrated in Australia-wide data on hospital admissions for older age groups (65 years +)[14].

Table 13: Gender Distribution between General and Specialty Medical Units in 1999/2000

	ARMC		MMC		RMH		SVH		All	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Female	1785	3312	589	2811	1916	3238	1108	1874	5398	11235
Male	1800	4305	493	3027	2084	4394	1217	2454	5594	14180
Total	3585	7617	1082	5838	4000	7632	2325	4328	10992	25415
males as % of total	50.2	56.5	45.5	51.8	52.1	57.6	52.3	56.7	50.9	55.8

5.6.2 Patient Characteristics

5.6.2.1 Co-morbidities

In the VAED, up to 12 associated diagnoses may be included as co-morbidities for each separation. Procedural data were not included in this analysis. There is some uncertainty about the consistency of data collection in the area of additional diagnoses and the following information should be interpreted with some caution.

However when the data were analysed using a Student's t test for independent groups, there was a highly statistically significant difference between each hospital's GMUs and SMUs ($p<0.0001$) for all conditions and for all GMU and SMU separations ($p<0.0001$). GMUs have a higher average number of co-morbidities for all conditions.

Table 14: Average number of co-morbidities from all conditions from VAED in 1999/2000

	Alfred		ARMC		MMC		RMH		SVH		All	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Mean	7.8	6.1	6.3	5.5	6.6	5.0	6.8	5.5	7.1	6.1	6.8	5.6
Median	8	6	6	5	6	4	6	5	7	6	6	5
SD	3.3	3.3	3.0	2.9	3.1	3.0	3.1	3.1	3.2	3.0	3.1	3.1

5.6.2.2 Re-admission rates

Although each hospital was sent a uniform dataset specification request, different data were returned in the area of re-admission. Unfortunately there did not seem to be any way of remedying this with the hospitals. Each hospital was requested to identify those patients who were re-admitted within 28 days of a previous admission – whether planned or unplanned. Two hospitals sent data on unplanned re-admission only, two sent both without any means of distinguishing between planned and unplanned and one sent planned and unplanned. With such disparity in response, the outcomes are reported here but limited comparisons can be made. There was a general trend towards lower re-admission rates in GMUs.

Table 15: Re-admission Rates within the 28 days prior to index episode of care in 1999/2000

	Alfred		ARMC		MMC		RMH		SVH	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Unplanned (% of subgroup seps)	1%	5%	n/a	n/a	n/a	n/a	1%	7%	n/a	n/a
Planned & unplanned (% of subgroup seps)	n/a	n/a	8%	19%	24%	28%	n/a	n/a	16%	20%

n/a = not available

5.6.2.3 Discharge Destination

Separations are coded on discharge to any one of 24 potential destinations[33]. For this dataset, the two most common destinations were home and transfer to other hospitals. For all destinations except home and, to subacute programs at MMC, there were higher proportions of patients in the GMUs.

Hostel accommodation is not separately recorded. Nursing home was the 4th most common discharge destination for GMUs but only the 6th highest for SMUs. Subacute care programs (such as rehabilitation, GEM or palliative care) were used by both GMUs and SMUs but only to a small extent. More patients leave against medical advice from GMUs than do from SMUs.

Table 16: Destination at Discharge (% of separations for total and each hospital's subgroup)

	Alfred		ARMC		MMC		RMH		SVH		All	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Home/Special Accommodation	57.4	88.4	75.6	86.1	71.7	81	79.6	89.0	71.8	86.5	73.9	86.4
Other hospital/facility	23.2	6.0	7.4	3.8	14.6	10.7	6.0	6.1	10.1	7.8	9.8	6.6
Deceased	9.4	3.7	6.8	4.1	6.4	3.7	6.7	2.8	7.8	2.4	7.2	3.4
Nursing Home	4.1	0.6	2.3	1.1	4.0	1.7	4.7	0.4	4.3	0.6	3.8	0.8
Subacute care programs	n/a	n/a	5.2	3.2	0.8	1.7	0.1	0.1	2.6	1.7	2.1	1.3
Left against medical advice	2.2	1.1	0.9	0.5	1.3	0.9	1.1	1.0	2.0	0.6	1.4	0.8
Changed to NH care type	0.7	0.1	1.1	0.9	n/a	n/a	n/a	n/a	0.4	n/a	0.5	0.2
Changed to Mental Health care type	3.0	0.1	0.6	0.3	n/a	n/a	n/a	n/a	0.5	0.2	0.6	0.1
Other formal discharge	n/a	n/a	n/a	n/a	0.3	0.2	1.3	0.6	0.4	0.2	0.5	0.2
Mental Health Residential Care	n/a	n/a	n/a	n/a	0.9	0.1	0.3	0.1	0.1	n/a	0.2	0.03

n/a = not applicable

A comparative analysis between GMU and SMU using multiple outcomes logistic regression was undertaken on discharge destinations. The comparisons were made to estimate the likelihood of being discharged to another destination other than home.

At The Alfred, all other destinations were significantly different ($p<0.0005$) between GMUs and SMUs with the GMUs more likely to send patients to other destinations. For ARMC, this was true for those patients who died, for patients discharged to nursing homes, other hospitals or subacute programs (eg. rehabilitation, palliative care, GEM or post acute care).

At MMC, this held true for patients who died, were discharged to nursing homes, other hospitals or mental health residential care. One area of particular difference was in discharge to subacute programs where SMUs were twice as likely to send patients than were GMUs.

For RMH, a statistically significant difference ($p<0.0005$) was seen for patients who died or were discharged to nursing homes or had "other formal discharge". For patients discharged to mental health residential care, this was significant at $p<0.002$. At SVH, a statistically significant difference ($p<0.0005$) was seen for patients who left against medical advice, died or were discharged to nursing homes or other hospitals. For patients discharged to subacute care programs, this was significant at $p<0.001$.

When all hospitals were pooled with adjustment for hospital, a statistically significant difference at $p<0.0005$ was evident for all discharge destinations. The relative rate ratio of discharge to each destination other than home is given for SMUs compared to GMUs. A number <1 indicates this destination was less likely for SMU than GMU separations.

Table 17: Discharge destinations other than home for combined hospitals: SMU vs GMU

Discharge Destination	Relative Rate Ratio	95% CI
Left against medical advice	.48	[.4, .59]
Deceased	.39	[.35, .42]
Change to NHT	.44	[.31, .63]
Change to MHT	.13	[.09, .19]
Nursing Home	.18	[.15, .21]
Other Hospitals	.50	[.46, .54]
Subacute programs	.58	[.50, .69]
Other formal discharge	.41	[.29, .58]
Mental Health Residential Care	.12	[.06, .25]

Further analysis looked at the Odds Ratio (OR) of the discharge destination being home rather than anywhere else, when comparing outcomes from SMUs and GMUs. For instance in the following table, it is evident that a patient at The Alfred was 5.6 times more likely to go home from SMUs than from GMUs.

Table 18: Odds Ratio of Going Home from SMU compared to GMU for each hospital

Hospital	OR	95% CI	p-value
Alfred	5.62	[4.94, 6.40]	<.0005
ARMC	2.00	[1.81, 2.21]	<.0005
MMC	1.68	[1.45, 1.94]	<.0005
RMH	2.07	[1.86, 2.29]	<.0005
SVH	2.51	[2.22, 2.85]	<.0005

To further examine this difference between the likelihood of going home, analyses of the GMU separations only were then undertaken. A comparison between hospitals was undertaken with ARMC. From this, there was only a 40% likelihood that a patient in GMU at The Alfred will go home compared to a patient in a GMU at ARMC. This appeared to be a function of the small number of patients in the GMU at The Alfred and that transfer to other hospitals was a likely destination.

Table 19: Odds Ratio of Going Home from GMU for each hospital in comparison to ARMC

Hospital	OR	95% CI	p-value
Alfred	0.44	[0.38, 0.50]	<.0005
MMC	0.82	[0.7, 0.95]	0.010
RMH	1.26	[1.13, 1.40]	<.0005
SVH	0.82	[0.73, 0.93]	<.001

5.6.2.4 Length of Stay

The length of stay of the multi-day separations for each hospital shows that on average, the GMU separations stay approximately 2 days longer than the SMU patients.

Table 20: Length of Stay for patients in 1999/2000

	Alfred		ARMC		MMC		RMH		SVH		All	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Mean	9.0	8.1	7.7	6.8	8.9	7.0	8.8	5.7	8.6	5.2	8.5	6.7
Median	5	4	5	4	6	5	5	3	6	3	5	4
SD	12.8	12.1	8.6	10.6	8.2	8.3	11.6	8.9	9.3	7.0	10.3	9.9

NB – Patients with a LOS of over 200 days have been excluded – there were 8 patients (4 at ARMC, 1 at RMH and 3 at The Alfred)

To examine the hypothesis that shorter average stays in SMUs may be due to different patient characteristics, the relative LOS was adjusted for the covariates of age, number of co-morbidities, discharge destination and gender (except at The Alfred, where gender was not available). This was done for each hospital, and separately for the HITH and non-HITH patients. The adjusted and unadjusted ratios between SMU's and GMU's mean LOS can then be compared. Only separations with LOS ≤ 100 days were included in the analysis presented below.

Table 21: GMU and SMU mean LOS for Non-HITH separations in 1999/2000

Hospital	Estimate	Ratio of Means	95% CI	p-value
The Alfred	Adjusted	1.01	[.96,1.07]	.703
	Unadjusted	.81	[.76,.86]	<.0005
ARMC	Adjusted	.98	[.94,1.01]	.169
	Unadjusted	.86	[.82,.89]	<.0005
MMC	Adjusted	.92	[.87,.96]	<.0005
	Unadjusted	.75	[.71,.80]	<.0005
RMH	Adjusted	.77	[.74,.80]	<.0005
	Unadjusted	.63	[.60,.65]	<.0005
SVH	Adjusted	.71	[.68,.74]	<.0005
	Unadjusted	.60	[.57,.62]	<.0005

In the non-HITH data, adjustment always reduced the difference in relative LOS between SMUs and GMUs, with The Alfred GMUs discharging patients slightly earlier than the corresponding SMUs and ARMC and MMC at about the same average LOS. SMUs at RMH and SVH continued to discharge patients at a shorter average LOS. This adjustment has not taken into account the potential influence of the patients' diagnosis.

5.6.2.5 Use of Hospital in the Home Service

When reviewing the use of HITH services, those separations, which were discharged from the care of a designated hospital in the home unit, were excluded from the analysis. Only those separations for which there was an indication that they were managed in hospital in the home program whilst under the care of the specific GMU or SMU were included.

Very few separations were transferred to the HITH program from the GMUs, especially at MMC. More patients from SMUs have some of their care delivered through HITH services.

Table 22: Use of Hospital in the Home Services by GMU and SMU in 1999/2000

	Alfred		ARMC		MMC		RMH		SVH		All	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
% of separations using HITH	2	7	3	14	0.4	7	3	2	2	2	3	7

A similar comparison of relative mean LOS to that undertaken with the non-HITH data was completed with the HITH data and the effect was similar, but not as pronounced or consistent in the HITH data.

Table 23: Relative mean LOS for HITH separations in 1999/2000

Hospital	Estimate	Ratio of Means	95% CI	p-value
The Alfred	Adjusted	.96	[.73,1.27]	.771
	Unadjusted	.76	[.56,1.01]	.062
ARMC	Adjusted	.68	[.54,.85]	.001
	Unadjusted	.69	[.54,.88]	.003
MMC	Adjusted	.68	[.31,1.52]	.354
	Unadjusted	.71	[.30,1.68]	.438
RMH	Adjusted	1.02	[.89,1.16]	.775
	Unadjusted	1.21	[1.04,1.41]	.013
SVH	Adjusted	1.00	[.74,1.36]	.993
	Unadjusted	.99	[.71,.1.39]	.973

5.6.3 Top Diagnosis Related Groups (DRGs) for GMUs

In analysing the DRGs across the 5 hospitals, it was evident that the great majority of DRGs only had a very small number of separations annually. In the following table, the total number of DRGs and the number of DRGs with less than 5 separations in 1999/2000 are presented for the GMUs.

Table 24: DRGs for General Medical Units in 1999/2000

	Alfred	ARMC	MMC	RMH	SVH
Number of DRGs	221	260	162	282	260
% of DRGs with ≤ 5 seps	77%	60%	75%	59%	65%

It was decided to that a Top 10 DRG list for each hospital would be developed. However in developing this list for each hospital, only data from the GMUs at each organisation rather than all medical DRGs were used. This eliminated patients who were admitted to hospital under surgical units but classified under a medical DRG at the point of discharge. Patients, who were not admitted to hospital, that is went home from ED or specialised HITH unit where no in-hospital stay was involved, were also not included in the analyses. As with the preceding analyses, paediatric, maternity and psychiatric services were also omitted from consideration.

When analysing the remaining data, a Top 10 may be decided by one of 3 variables; number of separations, number of bed-days used or the level of weighted inlier equivalent separations points (WIES) assigned to these separations. Consideration of WIES was not taken into account in these analyses. However the other 2 factors, volume of separations and bed-days used were combined to develop the top 10 DRGs for each hospital. This resulted in a slightly variable outcome in that one hospital had a top13, one a top 12, two hospitals a top 11 and one hospital a top 10.

The Top DRGs were representative of approximately 40% of the total workload undertaken by the GMUs at each hospital.

Table 25: Representativeness of the Top DRGs in GMUs for each hospital in 1999/2000

	Alfred		ARMC		MMC		RMH		SVH	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
% total seps	43%	9%	42%	13%	43%	16%	46%	14%	40%	8%
% total bed-days	40%	15%	46%	22%	42%	19%	47%	15%	43%	11%

5.6.3.1 The Alfred

The data analyses resulted in the following DRGs (codes and labels from Victorian DRG4.1) creating a top 13 at The Alfred.

A06Z - Tracheostomy Any Age, Any Condition
B64Z - Delirium
E62A - Resp Infections/Inflam W Cat CC
E62B - Resp Infect/Inflam W Sev/Mod CC
E65A - Chr Obstruct Airway Disease W Cat/Sev CC
F60A - Circ Dis W AMI No Inv Card Inv Pr+C/S CC
F62A - Heart Failure & Shock W Catastrophic CC
F62B - Heart Failure & Shock no Catastrophic CC
F71A - Non-Maj Arrhythmia+Conduct Dis W C/S CC
F73A - Syncope & Collapse W Catast/Severe CC
T60A - Septicaemia W Catastrophic or Severe CC
X62A - Poison/Tox Eff-Drugs,Oth Subs >59 or +CC
X62B - Poison/Tox Eff-Drugs,Oth Subs <60 No CC

Table 26: Top DRGs by Bed-days, Separations and Average LOS at The Alfred

		DRG													
		A06Z	B64Z	E62A	E62B	E65A	F60A	F62A	F62B	F71A	F73A	T60A	X62A	X62B	Total*
GM	Seps	27	27	64	68	52	28	43	56	21	29	15	86	54	543
	Bed-days	973	167	676	399	395	273	461	295	231	143	249	343	100	3732
	ALOS (dys)	36.0	6.2	10.6	5.9	7.6	9.8	10.7	5.3	11.0	4.9	16.6	4.0	1.9	6.9
SM	Seps	84	14	59	80	142	44	38	85	54	9	33	23	9	590
	Bed-days	4524	233	621	567	1257	415	561	633	281	33	360	76	23	5060
	ALOS (dys)	53.9	16.6	10.5	7.1	8.9	9.4	14.8	7.4	5.2	3.7	10.9	3.3	2.6	8.6

** all totals have omitted tracheostomy figures*

When the patient characteristics between GMUs and SMUs were compared, the patients were older in GMUs (except for the poisoning and toxic effects DRGs) and had similar but high levels of co-morbidities. The GMUs made little use of HITH. SMUs sent more patients home and both GMUs and SMUs transferred a large minority of patients to other hospitals.

Table 27: Patient characteristics and common discharge destinations in 1999/2000 - The Alfred

Unit	Variable	DRG											
		A06Z	B64Z	E62A	E62B	E65A	F60A	F62A	F62B	F71A	F73A	T60A	X62A	X62B
GM	Mean Age (yrs)	61.1	78.2	78.3	69.4	77.4	82.0	76.1	77.7	77.5	77.7	76.5	39.9	28.1
	Comorbidities (mean)	11.4	7.1	9.0	5.9	7.8	8.9	9.8	6.5	8.8	7.6	10.6	7.2	6.4
	% Use of HITH	4	0	0	3	4	0	5	0	10	0	0	0	0
	% D/C home	33	33	39	62	60	86	72	64	57	48	33	59	81
	% D/C NH	0	0	11	4	8	4	0	5	14	3	7	0	0
	% D/C other hosps	33	59	25	21	25	7	12	23	24	38	33	7	7
SM	Mean Age (yrs)	56.3	55.4	64.0	58.9	64.6	78.4	68.5	66.7	65.4	67.4	53.8	46.5	25.0
	Comorbidities (mean)	10.9	7.2	9.6	5.6	6.3	8.4	11.0	7.0	7.4	7.8	9.7	8.3	4.4
	% Use of HITH	7	0	2	4	3	2	8	5	6	0	18	0	0
	% D/C home	33	57	78	93	91	75	76	87	91	100	82	78	89
	% D/C NH	0	0	0	3	0	0	3	1	2	0	3	0	0
	% D/C other hosps	31	29	10	3	7	25	5	9	4	0	3	13	0

5.6.3.2 Austin and Repatriation Medical Centre

The data analyses resulted in the following DRGs (codes and labels from Victorian DRG 3.1) creating a top 11 at ARMC.

003 Tracheostomy Except for Mouth, Larynx or Pharynx Disorder Age>15
037 Cerebrovascular Disorders Except TIA W CC
038 Cerebrovascular Disorders Except TIA W/O CC
056 Dementia & Global Disturbances of Cerebral Function
170 Respiratory Infections/Inflam Age>54 W CC
171 Respiratory Infections/Inflam (Age>54 W/O CC) or (Age<55 W CC)
177 Chronic Obstructive Airways Disease
252 Heart Failure & Shock
269 Unstable Angina W CC
532 Miscellaneous Metabolic Disorders W CC
759 Red Blood Cell Disorders Age>64 W CC

Table 28: Top DRGs by Bed-days, Separations and Average LOS at ARMC

		DRG											
		3	37	38	56	170	171	177	252	269	532	759	Total*
GM	Seps	19	158	70	119	266	105	244	260	119	70	73	1484
	Bed-days	498	1861	497	1611	2551	556	1622	1925	576	600	380	12179
	ALOS (dys)	26.2	11.8	7.1	13.5	9.6	5.3	6.6	7.4	4.8	8.6	5.2	8.2
SM	Seps	51	130	88	52	91	35	288	104	72	63	42	965
	Bed-days	3218	1997	451	740	974	321	2190	725	406	363	344	8511
	ALOS (dys)	63.1	15.4	5.1	14.2	10.7	9.2	7.6	7.0	5.6	5.8	8.2	8.8

** all totals have omitted tracheostomy figures*

From the patient characteristics presented in the following table, it is evident that GMU patients were older. On the other parameters the units were comparable.

Table 29: Patient Characteristics and Common Discharge Destinations in 1999/2000 at ARMC

Unit	Variable	DRG										
		3	37	38	56	170	171	177	252	269	532	759
GM	Mean Age (yrs)	69.0	78.5	72.1	79.8	80.0	65.2	76.1	77.7	77.6	76.5	82.3
	Comorbidities (mean)	10.2	7.6	4.9	7.6	6.9	4.4	5.1	6.8	6.5	8.2	6.6
	% Use of HITH	0	1	0	0	3	7	1	1	2	1	0
	% D/C home	26	32	54	54	71	87	86	82	88	71	89
	% D/C NH	0	4	0	4	4	1	2	2	1	7	3
	% D/C other hosps	21	22	20	11	6	7	5	6	4	4	0
SM	Mean Age (yrs)	57.6	71.5	65.4	73.4	69.3	47.2	71.0	69.8	71.1	59.7	76.3
	Comorbidities (mean)	9.7	7.3	4.4	6.7	7.3	5.9	5.0	7.2	7.3	7.6	6.8
	% Use of HITH	6	1	0	2	3	14	4	0	3	3	2
	% D/C home	35	29	43	48	78	94	88	88	88	79	88
	% D/C NH	0	8	2	10	0	0	4	0	1	2	2
	% D/C other hosps	20	22	31	4	0	0	2	7	10	6	0

5.6.3.3 Monash Medical Centre

The data analyses resulted in the following DRGs (codes and labels from Victorian DRG 3.1) creating a top 10 at MMC.

056 Dementia & Global Disturbances of Cerebral Function
170 Respiratory Infections/Inflam Age>54 W CC
171 Respiratory Infections/Inflam (Age>54 W/O CC) or (Age<55 W CC)
177 Chronic Obstructive Airways Disease
248 Circ Disorders W AMI W/O Invasive Cardiac Inves Proc W Major CC
252 Heart Failure & Shock
269 Unstable Angina W CC
280 Non-Major Arrhythmia & Conduction Disorders Age>69 or W N-Maj CC
575 Kidney & Urinary Tract Infections Age>69 W CC
888 Poisoning/Toxic Effects of Drugs Age>59 or W CC

Table 30: Top DRGs by Bed-days, Separations and Average LOS at MMC

		DRG										
		056	170	171	177	248	252	269	280	575	888	Total
GM	Seps	24	94	25	42	19	118	48	29	26	36	461
	Bed-days	228	994	173	390	280	1014	442	145	253	151	4070
	ALOS (dys)	9.5	10.6	6.9	9.3	14.7	8.6	9.2	5.0	9.7	4.2	8.8
SM	Seps	83	191	75	229	30	88	94	67	30	19	906
	Bed-days	1213	2077	526	1555	272	687	415	260	350	155	7510
	ALOS (dys)	14.6	10.9	7.0	6.8	9.1	7.8	4.4	3.9	11.7	8.2	8.3

In the following table, it is evident that GMU patients were older and tended to have higher levels of co-morbidities. Very few patients from GMUs were referred to HITH and fewer patients went home from GMUs, with more patients transferred to Nursing Homes.

Table 31: Patient Characteristics and Common Discharge Destinations for 1999/2000 at MMC

Unit	Variable	DRG									
		056	170	171	177	248	252	269	280	575	888
GM	Mean Age (yrs)	73	79.0	68.4	73.5	80.5	75.5	79.6	75.6	81.9	43.4
	Comorbidities (mean)	6.5	7.5	4.8	6.5	9.1	6.9	7.1	4.6	7.2	7.7
	% Use of HITH	0	0	0	0	0	0	0	0	0	0
	% D/C home	46	56	68	71	53	78	79	79	69	58
	% D/C NH	8	6	4	7	5	2	2	0	4	0
	% D/C other hosps	33	22	16	14	42	12	19	21	15	17
SM	Mean Age (yrs)	78.7	74.7	52.2	65.9	73.6	68.9	68.0	66.5	83.4	47.6
	Comorbidities (mean)	7.3	6.9	4.9	4.2	8.6	7.4	6.7	4.9	8.5	8.5
	% Use of HITH	0	2	0	1	0	0	0	3	3	0
	% D/C home	49	73	87	81	73	84	89	96	67	68
	% D/C NH	12	5	1	3	0	0	1	0	3	11
	% D/C other hosps	29	13	7	9	20	10	3	4	23	11

5.6.3.4 Royal Melbourne Hospital

The data analyses resulted in the following DRGs (codes and labels from Victorian DRG 3.1) creating a top 12 at RMH.

003 Tracheostomy Except for Mouth, Larynx or Pharynx Disorder Age>15
037 Cerebrovascular Disorders Except TIA W CC
038 Cerebrovascular Disorders Except TIA W/O CC
056 Dementia & Global Disturbances of Cerebral Function
170 Respiratory Infections/Inflam Age>54 W CC
171 Respiratory Infections/Inflam (Age>54 W/O CC) or (Age<55 W CC)
177 Chronic Obstructive Airways Disease
249 Circ Disorders W AMI W/O Invasive Cardiac Inves Proc W/O Major CC
252 Heart Failure & Shock
261 Chest Pain
269 Unstable Angina W CC
888 Poisoning/Toxic Effects of Drugs Age>59 or W CC

Table 32: Top DRGs by Bed-days, Separations and Average LOS at RMH

		DRG												
		3	37	38	56	170	171	177	249	252	261	269	888	Total*
GM	Seps	33	183	63	181	270	72	265	90	300	151	159	68	1802
	Bed-days	1015	2613	567	3180	2559	500	1767	627	2284	329	812	281	15519
	ALOS (dys)	30.8	14.3	9.0	17.6	9.5	6.9	6.7	7.0	7.6	2.2	5.1	4.1	8.6
SM	Seps	33	125	49	35	99	71	61	116	59	285	91	10	1001
	Bed-days	1533	1416	261	316	625	358	289	621	294	571	348	48	5147
	ALOS (dys)	46.5	11.3	5.3	9.0	6.3	5.0	4.7	5.4	5.0	2.0	3.8	4.8	5.1

** all totals have omitted tracheostomy figures*

When GMU and SMU patients are compared in the following table, it can be seen that GMU patients were older and that more were discharged to nursing homes. Both GMU and SMUs patients had a high number of co-morbidities and made little use of HITH but transferred a large minority of patients to other hospitals.

Table 33: Patient Characteristics and Common Discharge Destinations for 1999/2000 at RMH

Unit	Variable	DRG											
		3	37	38	56	170	171	177	249	252	261	269	888
GM	Mean Age (yrs)	64.1	76.7	74.7	79.8	78.1	66.6	73.4	76.7	77.2	61.8	77.2	41.3
	Comorbidities (mean)	10.5	7.5	4.6	7.3	7.2	4.8	5.5	7.2	7.6	4.3	8.1	7.5
	% Use of HITH	0	2	0	1	2	3	2	2	2	0	0	0
	% D/C home	24	54	73	64	74	85	88	94	83	98	90	66
	% D/C NH	6	4	0	18	8	6	3	3	4	1	4	3
	% D/C other hosps	15	27	17	6	3	0	1	2	5	1	3	12
SM	Mean Age (yrs)	54.0	64.1	60.9	66.0	69.9	47.0	65.7	64.6	65.6	55.0	66.0	45.7
	Comorbidities (mean)	10.2	6.7	3.5	7.0	6.8	5.0	4.6	5.8	7.2	4.0	7.3	6.9
	% Use of HITH	0	1	0	0	0	0	0	4	2	0	1	10
	% D/C home	27	54	51	77	86	93	90	91	90	95	92	80
	% D/C NH	0	1	2	9	0	0	0	2	2	0	0	0
	% D/C other hosps	30	33	37	11	8	6	5	8	3	2	4	10

5.6.3.5 St Vincent's Hospital

The data analyses resulted in the following DRGs (codes and labels from Victorian DRG 3.1) creating a top 11 at SVH.

003 Tracheostomy Except for Mouth, Larynx or Pharynx Disorder Age>15
037 Cerebrovascular Disorders Except TIA W CC
056 Dementia & Global Disturbances of Cerebral Function
170 Respiratory Infections/Inflam Age>54 W CC
171 Respiratory Infections/Inflam (Age>54 W/O CC) or (Age<55 W CC)
177 Chronic Obstructive Airways Disease
252 Heart Failure & Shock
261 Chest Pain
280 Non-Major Arrhythmia & Conduction Disorders Age>69 or W N-Maj CC
575 Kidney & Urinary Tract Infections Age>69 W CC
888 Poisoning/Toxic Effects of Drugs Age>59 or W CC

Table 34: Top DRGs by Bed-days and Separations for GMU and SMU at SVH

		DRG											
		3	37	56	170	171	177	252	261	280	575	888	Total*
GM	Seps	46	70	42	137	73	172	188	42	58	38	74	894
	Bed-days	1158	835	471	1556	528	1265	1601	188	337	367	366	7514
	ALOS (dys)	25.2	11.9	11.2	11.4	7.2	7.4	8.5	4.5	5.8	9.7	4.9	8.4
SM	Seps	25	26	12	38	18	80	52	35	27	7	14	309
	Bed-days	618	159	90	293	154	508	369	140	119	43	62	1937
	ALOS (dys)	24.7	6.1	7.5	7.7	8.6	6.4	7.1	4.0	4.4	6.1	4.4	6.3

** all totals have omitted tracheostomy figures*

When comparing the GMU and SMU patient characteristics and discharge destination, the GMU patients were older, less likely to go home and more went to nursing homes. Only a small percentage of patients were transferred to HITH programs from either GMUs or SMUs with the exception of SMUs for the DRG related to kidney and urinary tract infections which had a 14% transfer to HITH.

Table 35: Patient Characteristics and Common Discharge Destinations in 1999/2000 at SVH

Unit	Variable	DRG										
	DRG	3	37	56	170	171	177	252	261	280	575	888
GM	Mean Age (yrs)	62.4	75.2	80.4	76.0	63.1	70.7	74.7	61.9	73.2	82.5	39.1
	Comorbidities (mean)	10.8	9.0	7.9	8.1	5.1	6.1	7.8	5.4	6.5	8.1	7.4
	% Use of HITH	0	0	0	3	4	4	1	0.0	2	0	0
	% D/C home	26	19	48	68	71	83	75	93	91	63	66
	% D/C NH	0	11	21	6	7	5	4	2	2	18	3
	% D/C other hosps	30	21	17	12	3	7	9	2	3	8	5
SM	Mean Age (yrs)	55.2	63.4	70.7	71.2	50.9	64.3	69.2	57.3	65.0	75.0	46.3
	Comorbidities (mean)	10.7	6.6	6.8	8.5	5.7	5.5	7.7	5.6	6.2	8.4	7.6
	% Use of HITH	0	0	0	0	6	5	4	0	0	14	0
	% D/C home	16	50	75	76	94	85	73	89	89	100	64
	% D/C NH	0	0	0	5	0	1	2	3	0	0	0
	% D/C other hosps	20	23	25	13	0	6	19	9	11	0	21

5.6.3.6 All Hospitals

To determine the most common DRGs across the 5 hospitals, the 22 DRGs from the previous section were reviewed. A DRG was included as a common DRG, if it was in the top listing at 3 or more hospitals. This resulted in a Top 9 DRG listing:

003 Tracheostomy Except for Mouth, Larynx or Pharynx Disorder Age>15
037 Cerebrovascular Disorders Except TIA W CC
056 Dementia & Global Disturbances of Cerebral Function
170 Respiratory Infections/Inflam Age>54 W CC
171 Respiratory Infections/Inflam (Age>54 W/O CC) or (Age<55 W CC)
177 Chronic Obstructive Airways Disease
252 Heart Failure & Shock
269 Unstable Angina W CC
888 Poisoning/Toxic Effects of Drugs Age>59 or W CC

As The Alfred data were coded into the Victorian DRG4.1 version, DRGs 170 and 171 were aggregated together resulting in 8 groupings for the following analyses, as a direct comparison was not otherwise possible. These groupings included approximately 19% of total separations for all units.
Data for 8 patients who had a LOS greater than 200 days were excluded from the analysis presented in the following table. An initial examination of this data showed that the patients in these DRGs were generally over 70 years of age and had more co-morbidities than the remainder of the patient separations for other conditions.

Table 36: Combined GMU and SMU Age and Comorbidities by DRG in 1999/2000

DRG Code	Mean LOS	Median LOS	LOS SD	Mean Age	Median Age	Age SD	Mean Comorbs	Median Comorbs	Comorbs SD
170&171	8.8	6	9.6	70.6	74	15.7	6.7	6	3.0
177	7.0	5	6.3	69.7	72	12.3	5.3	5	2.7
252	7.8	6	7.4	74.0	76	12.0	7.4	7	2.7
037	13.9	9	14.9	72.7	75	13.3	7.5	7	2.7
269	5.1	4	4.6	73.7	75	10.7	7.4	7	2.6
056	14.3	9	15.3	77.6	80	12.1	7.3	7	3.0
888	4.8	3	6.4	42.9	38	19.0	7.6	8	2.9
003	34.1	26	29.5	58.3	61	16.3	10.5	12	2.4
Other	6.6	4	9.2	58.3	61	18.9	5.7	5	3.1

The following table lists the ratio of SMU and GMU expected LOS (ELOS) by DRG group, after pooling all hospitals and adjusting for overall differences in LOS between hospitals. Values for the ratio of the ELOS which are < 1 indicate that SMUs separations have shorter expected LOS. This analysis included patients who were transferred to HITH.

Table 37: Relative ELOS by DRG group in 1999/2000

DRG Code	Frequency	Ratio of ELOS	95% CI	p-value
170&171	1930	.94	[.87,1.01]	.110
177	1729	.97	[.89,1.05]	.435
252	1391	.92	[.84,1.01]	.092
037	844	.89	[.79,1.01]	.072
269	685	.76	[.68,.85]	<.0005
056	456	.88	[.73, 1.05]	.151
888	410	1.22	[.98,1.52]	.082
003	318	1.05	[.9,1.22]	.524

For each hospital, the effect on LOS of being admitted to the care of a SMU or GMU was then adjusted for DRG, both alone and in combination with the other covariates of age, discharge destination, number of co-morbidities and gender (except at the Alfred). Adjustment always increased the ratio of SMUs to GMUs LOS. Again a value of <1 indicates a shorter length of stay in the SMUs. As there was a large degree of variability between GMU and SMU in the use of HITH, these separations were excluded from the following analysis.

Table 38: Relative ELOS by Hospital in 1999/2000

Hospital	Estimate	Ratio of ELOS	95% CI	p-value
The Alfred	Unadjusted	.81	[.76,.86]	<.0005
	Adjusted (except DRG)	1.01	[.96,1.07]	.703
	Adjusted (DRG only)	1.04	[.94,1.141]	.4661
	Adjusted (all)	1.09	[.99,1.20]	.073
ARMC	Unadjusted	.86	[.82,.89]	.169
	Adjusted (except DRG)	.98	[.94,1.01]	.020
	Adjusted (DRG only)	1.11	[1.04,1.19]	.002
	Adjusted (all)	1.10	[1.03,1.16]	.003
MMC	Unadjusted	.75	[.71,.80]	<.0005
	Adjusted (except DRG)	.92	[.87,.96]	<.0005
	Adjusted (DRG only)	.89	[.82,.98]	.017
	Adjusted (all)	.96	[.89,1.05]	.374
RMH	Unadjusted	.63	[.60,.65]	<.0005
	Adjusted (except DRG)	.77	[.74,.80]	<.0005
	Adjusted (DRG only)	.70	[.65,.76]	<.0005
	Adjusted (all)	.85	[.79,.92]	<.0005
SVH	Unadjusted	.60	[.57,.62]	<.0005
	Adjusted (except DRG)	.71	[.68,.74]	<.0005
	Adjusted (DRG only)	.80	[.72,.89]	<.0005
	Adjusted (all)	.87	[.80,.96]	.005

Adjustment for DRG was not appropriate for HITH separations due to the small numbers.

Analysis of the ELOS by discharge destination was then undertaken. Separations with LOS greater than 100 days and HITH patients were excluded. In the following table, the LOS is given relative to that for patients

discharged home, after adjusting for overall variations in LOS between hospitals. From the data it can be seen that for patients, whose care type was changed to Nursing Home (NHT), their ELOS is 6 times (GMU) or 7 times (SMU) that of a patient who was discharged home. Once this classification change has occurred the ELOS before placement in a nursing home/hostel occurs is twice as long for GMU and 3 times as long for SMU patients than if the patients went home.

Table 39: ELOS by Discharge Destination in 1999/2000

	GM			SM		
Discharge Destination	ELOS relative to Home	95% CI	p-value	ELOS relative to Home	95% CI	p-value
Against advice	.50	[.43,.58]	<.0005	.77	[.69,.86]	<.0005
Deceased	1.52	[1.44,1.61]	<.0005	2.34	[2.22,2.47]	<.0005
Change to NHT	5.87	[4.78,7.2]	<.0005	7.28	[5.96,8.89]	<.0005
Change to MHT	.77	[.62,.95]	.013	.77	[.55,1.02]	.064
Nursing Home	2.01	[1.86,2.17]	<.0005	3.03	[2.73,3.36]	<.0005
Other Hospital	1.75	[1.66,1.84]	<.0005	2.13	[2.04,2.22]	<.0005
Subacute Programs	2.67	[2.41,2.96]	<.0005	2.53	[2.32,2.75]	<.0005
Other formal D/C	1.66	[1.36,2.04]	<.0005	1.44	[1.16,1.80]	.002
Mental Health Residential	0.64	[.45,.92]	.016	1.87	[1.11,3.16]	.018

In reviewing the hospital stay for all patients, it is evident that the LOS data were skewed with long tails for each hospital, particularly in GMU. In order to review whether there was a similarity between the hospitals on this parameter for GMU, an analysis was undertaken which looked at the proportion of separations with a LOS which was greater than the mean plus two standard deviations. The hospitals' GMUs LOS was statistical significantly different ($p<0.01$) when tested using a likelihood ratio test.

Table 40: Proportion of high outlier patients in GMU in 1999/2000

	% in GM with LOS > mean + 2SD	95% CI
Alfred	0.070	[.060, .090]
ARMC	0.380	[.032, .045]
MMC	0.050	[.038, .065]
RMH	0.048	[.042, .055]
SVH	0.052	[.043, .062]

5.6.3.6.1 Comparison of Activity for GMU across all Hospitals

A comparison of the activity between GMUs (excluding DRG 888) was undertaken and is presented in the following series of tables. No hospital demonstrated consistently better performance across the DRGs. In some of the DRGs, for instance, DRG 037 (Stroke), very few patients were managed within the GMUs at The Alfred and MMC, similarly for DRG 056 (Dementia) at The Alfred. Gender data were not available (n/a) for the analyses from The Alfred.

Table 41: Comparison of GMU activity by specific DRG

a. Respiratory Infections/Inflammation (DRGs 170 & 171)

	Alfred	ARMC	MMC	RMH	SVH	All
Separations (n)	132	371	119	342	210	1174
Bed-days	1075	3107	1167	3059	2084	10492
ALOS (days)	8.1	8.4	9.8	8.9	9.9	8.9
Males (%)	n/a	54%	54%	64%	61%	58%
Mean Age (yrs)	73.7	75.8	76.8	75.7	71.5	75.1
Comorbidities (mean)	7.4	6.2	6.9	6.7	7.0	6.7
Use of HITH (%)	1.5%	3.8%	0%	2.3%	3.3%	2.6%
D/C home (%)	50.8%	75.2%	58.8%	76.3%	69%	70%
D/C NH (%)	7.6%	3.2%	5.9%	2.3%	6.2%	5.8%
D/C other hosps (%)	10.6%	5.9%	21.0%	7.6%	8.6%	7.4%

b. Chronic Obstructive Pulmonary Disease (DRG 177)

	Alfred	ARMC	MMC	RMH	SVH	All
Separations (n)	52	244	42	265	172	775
Bed-days	395	1622	390	1767	1265	5439
ALOS (days)	7.6	6.6	9.3	6.7	7.4	7.5
Males (%)	n/a	65%	69%	57%	52%	59.3%
Mean Age (yrs)	77.4	76.1	73.5	73.4	70.7	74.2
Comorbidities (mean)	7.8	5.1	6.5	5.5	6.1	6.2
Use of HITH (%)	4%	7%	0%	2%	4%	4%
D/C home (%)	60%	87%	71%	88%	83%	83.8%
D/C NH (%)	8%	1%	7%	3%	5%	3.4%
D/C other hosps (%)	25%	7%	6%	1%	7%	6.1%

c. Heart Failure (DRG 252)

	Alfred	ARMC	MMC	RMH	SVH	All
Separations (n)	99	260	118	300	188	965
Bed-days	756	1925	1014	2284	1601	7580
ALOS (days)	7.6	7.4	8.6	7.6	8.5	7.9
Males (%)	n/a	49	44	46	51	47.6
Mean Age (yrs)	77	77.7	75.5	77.2	74.7	76.4
Comorbidities (mean)	7.9	6.8	6.9	7.6	7.8	7.4
Use of HITH (%)	2	1	0	2	1	1.3
D/C home (%)	67.7	82	78	83	75	79
D/C NH (%)	3	2	2	4	4	3.1
D/C other hosps (%)	18.2	6	15	5	9	8.6

e. Unstable Angina (DRG 269)

	Alfred	ARMC	MMC	RMH	SVH	All
Separations (n)	20	119	48	159	28	374
Bed-days	120	576	442	812	165	2115
ALOS (days)	6.0	4.8	9.2	5.1	5.9	6.2
Males (%)	n/a	43	46	52	64	49.2
Mean Age (yrs)	83	77.6	79.6	77.2	74.2	78.3
Comorbidities (mean)	8	6.5	7.1	8.1	7.5	7.4
Use of HITH (%)	0	2	0	0	0	0.6
D/C home (%)	75	88	79	90	100	87.9
D/C NH (%)	5	1	2	4	0	2.5
D/C other hosps (%)	20	4	10	3	0	4.9

f. Dementia and Global Disturbances of cerebral function (DRG 056)

	Alfred	ARMC	MMC	RMH	SVH	All
Separations (n)	7	119	24	181	42	373
Bed-days	86	1611	228	3180	471	5576
ALOS (days)	12.3	13.5	9.5	17.6	11.2	14.9
Males (%)	n/a	43.7	54.2	43	35.7	43.2
Mean Age (yrs)	78.4	79.8	73	79.8	80.4	78.3
Comorbidities (mean)	7.3	7.6	6.5	7.3	7.9	7.3
Use of HITH (%)	0	0	0	1	0	0.5
D/C home (%)	57.1	54	46	64	48	57.6
D/C NH (%)	14.3	4	8	18	21	13.7
D/C other hosps (%)	28.6	11	33	6	17	11

g. Cerebrovascular Disorders Except TIA w CC (DRG 037)

	Alfred	ARMC	MMC	RMH	SVH	All
Separations (n)	4	158	13	183	70	428
Bed-days	45	1861	198	2613	835	5552
ALOS (days)	11.3	11.8	15.2	14.3	11.9	13.0
Males (%)	n/a	42	38.5	55	50	49
Mean Age (yrs)	75.8	78.5	77.6	76.7	75.2	76.8
Comorbidities (mean)	11	7.6	8.1	7.5	9.0	8.6
Use of HITH (%)	0	0.6	0	2	0	1.2
D/C home (%)	25	32	53.9	54	19	39.5
D/C NH (%)	0	4	15.4	4	11	5.6
D/C other hosps (%)	50	22	0	27	21	23.6
D/C to subacute programs (%)	0	23	0	0	12	11.4

5.6.3.6.2 Comparison of GMU expected LOS by hospital

Five of the conditions for the GMUs were subjected to further analysis. These analyses were for relative expected LOS (ELOS) after adjusting for the covariates of age, number of co-morbidities and discharge destination. Gender could not be included because the Alfred did not provide it. All ELOS were relative to RMH, which had the largest number of cases in each of these DRG categories. It should be noted that the numbers at The Alfred were generally smaller for each condition than at any of the other hospitals, leading to greater width in the 95% confidence intervals. To establish whether the expected hospital stay was the same

across all hospitals, the Likelihood Ratio method was used. These analyses found statistically significant differences in ELOS for specific DRGs between the hospitals.

Table 42: Comparison of LOS by Specific DRGs in GMUs in 1999/2000

Hospital	COPD		Heart Failure		Resp Infection /Inflammation		Cerebro-vascular Accident		Unstable Angina	
	Rel. LOS	95% CI	Rel. LOS	95% CI	Rel. LOS	95% CI	Rel. LOS	95% CI	Rel. LOS	95% CI
Alfred	0.68	[.53,.87]	0.77	[.64,.93]	0.78	[.66,.93]	0.73	[.40,1.32]	0.58	[.42,.81]
ARMC	0.81	[.65,1.01]	0.82	[.70,.95]	0.90	[.78,1.04]	0.72	[.49,1.05]	0.60	[.49,.75]
MMC	0.83	[.67,1.03]	0.78	[.68,.91]	0.92	[.79,1.06]	0.97	[.67,1.41]	0.56	[.46,.69]
SVH	0.85	[.68,1.06]	0.87	[.74,1.02]	1.04	[.89,1.21]	0.55	[.37,.82]	0.71	[.53,.96]
p-value	.019		.002		.015		.000		.000	

From this analysis it can be seen that no individual hospital consistently outperformed the others. There were significant differences by condition, which warrant further investigation. Better performances on the ELOS analyses were at The Alfred for respiratory conditions (both infections and COPD), at SVH for stroke and at MMC for UA.

5.6.3.6.3 Comparison of separations by hospital

The overall aggregation of the separations reflected the previous outcomes on average LOS namely that SMU patients have a shorter length of stay than GMU patients do.

Table 43: Hospital comparison of activity in 1999/2000

	GM					SM					All Hospitals		
Hospital	Alfred	ARMC	MMC	RMH	SVH	Alfred	ARMC	MMC	RMH	SVH	GMU	SMU	All
Seps	1311	3585	1082	4002	2325	7882	7617	5838	7635	4328	12305	33300	45605
Bed-days	11822	27526	9605	35127	20087	63530	52087	41009	43334	22624	104167	222584	326751
ALOS	9	7.7	8.9	8.8	8.6	8.1	6.8	7	5.7	5.2	8.5	6.7	7.2
% seps with LOS ≥ 14 days	17.7	14.3	19	16.2	18.2	15.5	11.9	11.4	8.2	7.3	16.4	11.2	12.6

When the influence of discharge destination was considered, variability in the LOS between hospitals became evident. The following series of tables provide the findings by the three most common community destinations. A variable proportion of multi-day medical in-patients were long stayers with a LOS greater than 13 days. Patients went home more quickly from SMU than GMU but were transferred more quickly to both other hospitals and nursing homes from GMU than from SMU.

Table 44: Activity by discharge destinations for both individual hospital and all hospitals

a Home as discharge destination

Variable	GM					SM					All Hospitals		
	Alfred	ARMC	MMC	RMH	SVH	Alfred	ARMC	MMC	RMH	SVH	GMU	SMU	All
n	753	2711	776	3187	1670	6962	6557	4726	6794	3744	9097	28783	37880
% total seps	57.4	75.6	71.7	79.6	71.8	88.3	86.1	81.0	89.0	86.5	73.9	86.4	83.1
bed-days	6172	15776	6227	23975	12469	48476	36090	28953	34655	17057	64619	165231	229850
% total bed-days	52.2	57.3	64.8	68.3	62.1	76.3	69.3	70.6	80.0	75.4	62.0	74.2	70.3
ALOS	8.2	5.8	8.0	7.5	7.5	7.0	5.5	6.1	5.1	4.6	7.1	5.7	6.1

b Other Hospitals as a discharge destination

Variable	GM					SM					All Hospitals		
	Alfred	ARMC	MMC	RMH	SVH	Alfred	ARMC	MMC	RMH	SVH	GMU	SMU	All
n	304	265	158	239	235	473	291	627	463	339	1201.0	2193.0	3394
% total seps	23.2	7.4	14.6	6.0	10.1	6.0	3.8	10.7	6.1	7.8	9.8	6.6	7.4
bed-days	3156	3201	1801	3801	2751	8111	3496	7952	4980	2631	14710	27170	41880
% total bed-days	26.7	11.6	18.8	10.8	13.7	12.8	6.7	19.4	11.5	11.6	14.1	12.2	12.8
ALOS	10.4	12.1	11.4	15.9	11.7	17.1	12.0	12.7	10.8	7.8	12.2	12.4	12.3

c Nursing Home as a discharge destination

Variable	GM					SM					All Hospitals		
	Alfred	ARMC	MMC	RMH	SVH	Alfred	ARMC	MMC	RMH	SVH	GMU	SMU	All
n	54	84	43	190	100	45	86	97	30	24	471	282	753
% total seps	4.1	2.3	4.0	4.7	4.3	0.6	1.1	1.7	0.4	0.6	3.8	0.8	1.7
bed-days	556	1331	628	2936	1417	965	1814	1430	365	242	6868	4816	11684
% total bed-days	4.7	4.8	6.5	8.4	7.1	1.5	3.5	3.5	0.8	1.1	6.6	2.2	3.6
ALOS	10.3	15.8	14.6	15.5	14.2	21.4	21.1	14.7	12.2	10.1	14.6	17.1	15.5

As a subset analysis of the total sample, those patients whose LOS exceeded 13 days were further examined. This subset represented less than 13% of the total separations but utilised almost 50% of the total bed-days provided. Nearly 10% of this group died whilst in hospital.

Table 45: Comparison of activity for patients who have a LOS of 14 days or more

Variable	GM					SM					All Hospitals		
Hospital	Alfred	ARMC	MMC	RMH	SVH	Alfred	ARMC	MMC	RMH	SVH	GMU	SMU	All
Seps	232	513	206	649	422	1220	907	666	625	318	2022	3736	5758
Bed-days	6786	12369	4606	18387	10168	35613	28328	16172	17613	7704	52316	105430	157746
ALOS	29.3	24.1	22.4	28.3	24.1	29.2	31.2	24.3	28.2	24.2	25.9	28.2	27.4
% total seps	17.7	14.3	19.0	16.2	18.2	15.5	11.9	11.4	8.2	7.3	16.4	11.2	12.6
% total bed-days	57.4	44.9	48.0	52.3	50.6	56.1	54.4	39.4	40.6	34.1	50.2	47.4	48.3

Although the data is not included here, statistical comparisons of LOS performance by community discharge destinations were made using a likelihood ratio test. There were statistically significant differences between the hospitals for both GMU and SMU.

From the following tables it was evident that SVH SMUs consistently had the best LOS outcome in comparison to the remainder, whereas for GMU, MMC had better LOS performance outcomes for the destinations of "other hospital" and "nursing home". ARMC demonstrated the best LOS performance for home as the discharge destination from GMU.

Table 46: Activity by discharge destinations for patients in hospital for 14 or more days

a Home as discharge destination

Variable	GM					SM					All Hospitals		
	Alfred	ARMC	MMC	RMH	SVH	Alfred	ARMC	MMC	RMH	SVH	GMU	SMU	All
n	110	179	103	392	205	878	527	370	442	199	989	2416	3405
% total seps	47.4	34.9	50	60.4	48.6	72	58.1	55.6	70.7	62.6	48.9	64.7	59.1
bed-days	2709	3737	2196	10152	4752	22378	13835	8680	11769	4403	23546	61065	84611
% total bed-days	39.9	30.2	47.7	55.2	46.7	62.8	48.8	53.7	66.8	57.2	45.0	57.9	53.6
ALOS	24.6	20.9	21.3	25.9	23.2	25.5	26.3	23.5	26.6	22.1	23.8	25.3	24.8

b Other Hospitals as a discharge destination

Variable	GM					SM					All Hospitals		
	Alfred	ARMC	MMC	RMH	SVH	Alfred	ARMC	MMC	RMH	SVH	GMU	SMU	All
n	73	89	55	102	78	188	82	204	108	55	397	637	1034
% total seps	31.5	17.3	26.7	15.7	18.5	6	9	30.6	17.3	17.3	18.7	17.1	18
bed-days	2403	2148	1281	2985	1922	6527	2376	5165	3275	1220	10739	18563	29302
% total bed-days	35.4	17.4	27.8	16.2	18.9	18.3	8.4	31.9	18.6	15.8	20.5	17.6	18.6
ALOS	32.9	24.1	23.3	29.3	24.6	34.7	29	25.3	30.3	22.2	27.1	29.1	28.3

c Nursing Home as a discharge destination

Variable	GM					SM					All Hospitals		
	Alfred	ARMC	MMC	RMH	SVH	Alfred	ARMC	MMC	RMH	SVH	GMU	SMU	All
n	12	35	24	58	44	20	48	42	9	6	173	125	295
% total seps	5.2	6.8	11.7	8.9	10.4	1.6	5.3	6.3	1.4	1.9	8.6	3.3	5.1
bed-days	343	1030	516	2234	1101	842	1565	1061	263	151	5224	3882	9106
% total bed-days	5.1	8.3	11.2	12.1	10.8	2.4	5.5	6.6	1.5	2.0	10.0	3.7	5.8
ALOS	28.6	29.4	21.5	38.5	25	42.1	32.6	25.3	29.2	25.2	30.2	31.1	30.9

5.7 Patient and Carer Experience of medical in-patient care

To obtain the patient and carer perspective on hospital stay under the care of a general medical unit, an external consulting company, Campbell Research and Consulting were contracted to conduct this section of the project. There is no personal or financial relationship between any member of Campbell Research and Consulting and any member of the Clinical Epidemiology and Health Service Evaluation Unit or any other consultant associated with this project. A copy of the full report is attached as Appendix 1.

5.7.1 Recruitment Process for Focus Groups

At each hospital, a listing of all patients admitted to GMUs between April and August 2000 was obtained. From the listing, patients who had died, did not live locally to the hospitals, had no telephone number, or had been admitted to hospital since August 2000 were deemed ineligible. Patients were then contacted consecutively from each page of the listing. Unfortunately, those patients who could not hold a telephone discussion in English were also invited, as being an active participant is important in the Focus Group process.

For RMH patients, 118 patients were contacted to obtain 8 patients plus 2 carers who agreed to attend the session. Of those not willing to participate, most stated that they felt too unwell to attend such a group. On the day of the focus group, 3 patients rang and cancelled, as they felt too unwell to attend.

For MMC patients, 10 patients and 4 carers agreed to attend from the 60 patients who were contacted. Three patients and 1 carer rang and cancelled prior to the day. However, only 3 of the remaining 10 kept the appointment. The non-attenders were contacted in the 24 hours after the focus group to see if there were common reasons for non-attendance. The only common reason given was a clash of appointments with other health service providers (2) and the remaining 5 did not have a particular reason, they just did not want to come on that day.

5.7.2 Outcomes from the Focus Groups

The focus groups set out to identify the primary broad issues of importance in hospital care as perceived by recent medical in-patients admitted to the RMH and MMC. Both received high praise from participants and they were particularly generous in their comments toward staff abilities and friendliness.

The primary outcome from the focus groups was recognition that the most important aspects of hospital care change as patients' situations change. At the time of admission, being settled in a ward quickly was perceived as essential. Patients did not feel they have really been treated, nor do they feel they can commence recovery until they were settled in the ward. During the hospital stay relationships with staff were critical in determining patient perception of care. Confidence in staff abilities, as well as being treated with courtesy and respect, were tightly linked to helping patients feel integrated with their care program and able to ask questions of staff caring for them. As patients began to improve, planning for discharge became the most important issue. Participants were curious about preventing a recurrence of the illness, as well as preoccupied with ensuring they made appointments with specialists, where appropriate, after discharge. Most participants felt they did not have enough information about after-hospital care.

At the end of the focus group discussion patients identified the following as key factors:

- Level A – quick admission;
- Level B – feeling comfortable and secure that they are being well-looked after;
- Level C – discharge planning; and
- Level D – assumptions of hospital care.

5.8 Summary

5.8.1 Findings from Victorian Admitted Episode Dataset

Data for 1999/2000 were extracted from the VAED by each hospital in order that analysis by specific medical unit would be possible. As the primary area of interest was in GMU and SMU multi-day separations, the data for ED, Psychiatric, Paediatric (all children younger than 14) and Obstetric units were excluded. Planned same day separations were not analysed.

The resultant dataset had over 45,000 separations for analysis. In the case of 4 of the 5 hospitals, medical unit multi-day separations represented more than 40% of their in-patient based workload. This was much lower at MMC (27%) which also provides large paediatric and maternity services not available to the same extent at the other hospitals.

All hospitals had very high occupancy rates (>99%). For 95% of patients, admission to GMUs was an unplanned emergency. Specialist units had more planned admissions, with only 60% overall admitted as emergencies. In general, the characteristics of patients admitted to GMU indicated they were significantly older (average age of 70 years), had more co-morbidities and there were slightly more men than women. The majority of medical patients were discharged home but patients were twice as likely to go home from SMU than from GMU.

Initial analysis of activity performance based on average LOS demonstrated that patients stayed for shorter times in SMU than GMU. When factors such as DRG, age, gender and discharge destination were included as co-variates, analyses demonstrated that difference in performance between GMU and SMU was reduced but significant differences in performance remained. GMUs at The Alfred and ARMC now were more likely to discharge patients earlier than their equivalent SMUs, performance for both groups was very similar at MMC and at RMH and SVH, the SMUs still discharged their patients earlier. This may be a reflection of the short LOS in SMUs at RMH and SVH when compared with their counterparts at the other hospitals.

The use of HITH was very small in GMU but overall was much higher in SMU, although this was very variable. This variability warrants further investigation as it may represent an opportunity for further improvement in bed management at all hospitals.

When the highest volume DRGs for GMUs were compared, important differences emerged. Firstly there was a large degree of variability between hospitals on average LOS. However the use of average LOS as a performance indicator may be misleading. From this data set, it was apparent that there was a very wide distribution for LOS. There were a small but influential number of separations which had a very long LOS. These separations utilised a disproportionately large percentage of the available bed-days. Statistical analysis of high outlier patients remaining in hospital for greater than the hospital average LOS plus two standard deviations demonstrated that 7% of patients of The Alfred are in this group, whereas the other hospitals have 5% or less. The second key point of difference was in the area of discharge. The type of location to which patients were discharged varied greatly between hospitals. Whilst home was the most common destination, the next most common destination was a category entitled "other hospital" and then "nursing home" which covers both nursing home and hostel placement. In comparing activity by the common high volume DRGs across the GMUs, no hospital consistently outperformed the others. Better performance on average LOS was seen in the management of respiratory conditions at The Alfred, in unstable angina at MMC and in stroke at SVH.

The discharge destination has a very significant influence on LOS. The proportion of patients discharged to home was approximately 83% for all multi-day medical patients with lower proportions of GMU patients (74%) being discharged to home. The average LOS for this group was 6.1 days. There was variability between hospitals in both proportions of patients discharged home and the average LOS for these patients.

The proportion of patient accounted for in the "other hospital" destination was 7.4% with an average LOS of 12.3 days. The extent to which patients were discharged to "other hospital" varied greatly between hospitals with The Alfred generally sending the highest proportions of patients from its high volume DRGs to this destination. The LOS for this destination showed high variability between hospitals for both GMU and SMU.

The proportion of patients discharged to a nursing home placement was much higher from GMUs than SMUs but overall represented only a small percentage (1.7%) of separations, with an average LOS of 15.5 days. There was variability in LOS evident between hospitals. It was interesting to note that the proportion of patients being discharged to a nursing home was least at RMH which may be a reflection of the lower availability of beds in the surrounding catchment area.

A separate analysis of the impact of discharge destination upon LOS was undertaken for the long stay subset of patients (LOS $\geq$ 14 days). Overall this long stay group accounted for 12.6% of multi-day stay medical in-patients, with an average LOS of 27.4 days, representing 48.3% of total bed days. The proportion of long stay patients in GMU was higher but the average LOS in SMU was greater. Variability in both the proportion of separations and average LOS was evident between hospitals for both SMU and GMU.

The proportion of long stay patients discharged home was 59%. A higher proportion of SMU long stay patients went home. ARMC had the lowest average LOS for long stay patients discharged home.

For the 18% of long stay patients discharged to other hospitals, there was a high degree variability in average LOS and proportions discharge between hospitals and between GMU and SU for this destination. The average of LOS was 28.3 days.

Overall, 5.1% of long stay patients were discharged to a nursing home, with an average LOS of 30.9 days. The proportion of GMU long stay patients (8.6%) discharged to nursing homes was greater than for SMU patients (3.3%). There was a high degree of between hospital variability in both proportion of separations (GMU 5% -12%) and average LOS (GMU 21.5 days - 38.5 days) for this discharge destination.

5.8.2 Consumer Perspective

From the consumers' perspective, both MMC and RMH met most needs and expectations of all group participants. The primary areas for improvement at RMH included better access to showers in some wards and increased evidence of cleanliness. At MMC the sample was too small to identify particular issues needing change. Both hospitals performed exceedingly well in terms of staff relations with patients.

6. Outcomes from Study 2 - Census of Medical In-patients

It was planned in the study methodology to conduct the census on the same date in each of the five hospitals. Due to logistical factors, the census had to be conducted at two separate times. Three hospitals, (SVH, Alfred and RMH) conducted the census on all patients admitted under medical units at 8.00am on Wednesday the 30th of August 2000 and for the other two hospitals (MMC and ARMC) on Wednesday 6th of September 2000. The same data collection tool was used at each site and is available on request to Clinical Epidemiology and Health Service Evaluation Unit of Melbourne Health.

6.1 Exclusion Criteria for Subjects

Discussion with members of the Advisory Committee prior to data collection commencement, lead to the exclusion of the following clinical service areas from the census:
Paediatrics and Obstetrics

- Psychiatric services
- Same Day patient admissions (planned)
- Emergency department patients who had not been accepted by unit staff at 8.00am
- Only patients on the Austin campus of ARMC, on the Prahran campus for Alfred (i.e. not Caulfield), Clayton Campus for MMC (i.e. not Moorabbin or McCullough House), RMH only (i.e. not patients at MECRS), not Caritas Christi patients at SVH.
- Adult Cystic Fibrosis
- Allogenic Bone Marrow Transplants (at Alfred and RMH)
- Heart, Lung and Liver transplants (at Alfred and ARMC)
- Victorian Respiratory Support Services (at ARMC)
- Spinal Unit services (at ARMC)
- Interventional procedures which normally have a length of stay of ≤ 30 hours (eg. angioplasty, angiograms etc).
- Onsite subacute care services (eg. rehabilitation, palliative care or GEM).

Restricted data collection was undertaken on patients in Intensive Care – only those patients who were under the care of a medical unit were collected.

6. 2 Census Results

6.2.1. Numbers of Patients included in the Census

A total of 932 patients were included in the full census data collection with only basic information collected on the 24 patients in intensive care on the census date.

Table 47: Distribution of patients included in the Census

	GM	SM	ICU	Total	% GM of total*
Alfred	36	153	4	193	19
ARMC	67	131	7	205	34
MMC	54	135	5	194	29
RMH	84	127	8	219	40
SVH	53	92	0	145	37
ALL	294	638	24	956	32

**Excluding ICU patients*

6.2.2 Units caring for Patients included in the Census

After excluding patients in intensive care, the number of patients and the proportion of the total hospital sample size that they represented are presented in the following table.

Table 48: Distribution of census patients by medical unit providing care at each hospital

Unit n, (% of total)	Alfred (n=189)	ARMC (n=198)	MMC (n=189)	RMH (n=211)	SVH (n=145)
Bone Marrow Transplant	2,(1%)				
Cardiology	29,(15%)	19,(10%)	18,(10%)	28,(13%)	16,(11%)
Clinical Nutrition			2,(1%)		
Dermatology				1,(0.5%)	1,(1%)
Emergency Medical*					18,(12%)
Endocrine	2,(1%)	2,(1%)	2,(1%)	4,(2%)	3,(2%)
Epilepsy		6,(3%)			
Gastroenterology	6,(3%)	6,(3%)	15,(8%)	15,(7%)	11,(8%)
General Medical	36,(19%)	67,(34%)	54,(29%)	84,(40%)	53,(37%)
Geriatric (Acute)			13,(7%)		
Haematology	5,(3%)	11,(6%)	1,(1%)		7,(5%)
Infectious Diseases	29,(15%)		8,(4%)	10,(5%)	
Nephrology	20,(11%)	15,(8%)	19,(10%)	33,(16%)	9,(6%)
Neurology	6,(3%)	6,(3%)	12,(6%)	9,(4%)	6,(4%)
Oncology	23,(12%)	34,(17%)		17,(8%)	8,(6%)
Respiratory Medicine	15,(8%)	19,(10%)	16,(8%)	8,(4%)	2,(1%)
Rheumatology	4,(2%)	2,(1%)	5,(3%)	2,(1%)	3,(2%)
Stroke	9,(5%)	9,(5%)	21,(11%)		8,(6%)
Toxicology		2,(1%)			
Transplant	3,(2%)				
Vascular Medicine			3,(2%)		

**EMU is a 48 hour short stay area with more intensive staffing and patients have been included in the SMUs in subsequent analyses.*

6.2.3 Age grouping of Patients included in the Census

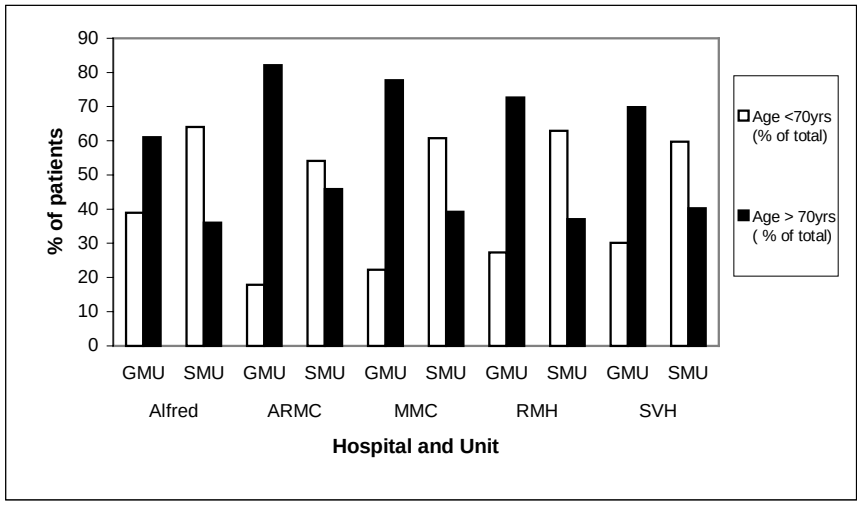
As expected, there were more patients in the older age groups with few patients younger than 20.

Table 49: Age distribution of census patients

	Alfred		ARMC		MMC		RMH		SVH	
Age	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
	(% of total patients for either GMU or SMU at each hospital)									
20 or <				1	1			1		1
21-30		5		2	1	5		4	1	1
31-40	1	9		4	1	6	1	6		6
41-50	2	11	1	7	1	5	2	8	1	8
51-60	3	12	3	13	1	11	3	12	3	12
61-70	2	20	3	16	3	16	5	12	6	10
71-80	6	15	9	19	8	14	11	13	19	16
81-90	4	8	17	5	12	12	14	4	7	7
>90	2	1	3	1	2	3	4			1

When the age group is divided into patients younger than 70 or 70 years and older, all hospitals demonstrated that a greater proportion of patients, 70 or older are managed by the GMUs.

Figure 3: Distribution of patients younger than 70 years or 70 years and older



6.2.4 Gender distribution of Census Patients

There was a fairly even distribution of males and females. There was a trend towards more males than females in the SMUs and more females than males in the GMUs.

Table 50: Gender distribution of census patients

Gender	Alfred		ARMC		MMC		RMH		SVH		All	
	(% total patients for either GMU or SMU at each hospital)											
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Females	42	43	57	51	52	41	54	43	53	49	52	45
Males	58	57	43	49	48	59	46	57	47	51	48	55

6.2.5 Discharge Diagnosis Related Group

Following the census day, patients' index episode of care was monitored to collect the Victorian diagnosis related group version 4.1 (Vic DRGs) when each patient was discharged. On the last day of data collection for the final phase of the whole study (20/10/2000), those patients without an assigned DRG from the census day admission period were reviewed again to update the records. From the data submitted for analysis, it was apparent that at each site there were patients who had not been discharged and patients who had been discharged but had not yet been assigned a Victorian DRG code.

From those separations with a classification assigned, it is evident that few separations are considered to be from the same diagnostic group. At any of the hospitals, the highest number of separations with the same DRG was 10. As illustrated in the following table for the SMUs approximately 30% were for DRGs with multiple separations, whereas for the GMUs 37% had multiple separations.

Table 51: Volume of DRG classifications for census patients when discharged

	Alfred	ARMC	MMC	RMH	SVH
Number of DRGs for					
- All Units (% of total seps. for subgroup)	105,(66%)	102,(59%)	104,(62%)	99,(62%)	89,(66%)
- GM Units (% of total seps. for subgroup)	23,(82%)	38,(63%)	32,(67%)	42 (72%)	35,(71%)
- SM Units (% of total seps. for subgroup)	93,(70%)	83,(73%)	84,(69%)	75,(74%)	66,(78%)
Still in hospital	7	18	11	17	0
Uncoded	22	7	11	34	11
Highest number of separations for same DRG	5	7	9	7	10

As so few of the separations were in the same DRG, the information was re-sorted into the most common diagnoses across the 5 hospitals and the findings are presented in the following table.

Table 52: Common Patient Conditions from Census data

Aggregated Diagnostic group Description	n	% of total
Respiratory infections/inflammations with or without complications	47	5%
Chronic Obstructive Pulmonary Disease	39	4%
Stroke with/without complications	34	4%
Heart Failure and Shock with/without complications	33	4%
Percutaneous Coronary Angioplasty (with or without AMI/with or without stent)	23	2%
Circulatory disorder with AMI, no invasive investigation and with/without complications	20	2%
Tracheostomy	18	2%
Delirium	11	1%

6.2.6 Duration of Hospital Stay on Census Day

As the census day provided a snapshot of patients who were in hospital on that day, it did not provide information about the average length of hospital stay for these patients. It did enable a comparison to be made of the time already spent in hospital. From the following table it is evident that on census day, SVH had few patients with a long duration of stay in either GMU or SMU. The median duration of stay (DOS) was comparable across the hospitals but mean DOS was high at Alfred, RMH and ARMC and lower at MMC and particularly so at SVH.

Table 53: Duration of stay of census patients

Hospital	GM		SM		ALL	
	Mean	Median	Mean	Median	Mean	Median
			(days in hospital)			
Alfred	21.7	6	13.8	7	15.3	7
ARMC	15.4	8	14.5	8	14.8	8
MMC	10.4	8	11.4	7	11.1	7
RMH	17.1	7	10.1	5	12.9	5
SVH	7.5	6.5	8.3	5	8.0	6

6.2.7 Previous Hospital Admissions

From the data collected on the patients in hospital on census day, it was apparent that approximately 40% of them had had at least one admission to hospital in the previous 12 months with up to a third of patients having more than 3 admissions in that time.

Table 54: Hospital admissions in the last 28 days and last 12 months for census patients

Hospital		No admissions in last 12 mths (% of patients)	Had an admission in last 28 days (% of patients)	Had an admission in last 12 months (% of patients)	3 or more admissions in the last 12 months (% of patients)
Alfred	GM	47	25	53	17
	SM	44	27	55	30
ARMC	GM	64	15	36	9
	SM	37	31	63	33
MMC	GM	59	9	41	6
	SM	62	12	38	12
RMH	GM	58	15	42	18
	SM	57	21	43	14
SVH	GM	43	13	57	15
	SM	54	23	46	29
ALL	GM	56	15	44	13
	SM	50	23	49	24

6.2.8 Elective or Emergency Admission

Emergency admissions were the most common admission type seen in the GMUs with only SVH reporting below 90% of patients being admitted as an emergency. By contrast for SMUs at The Alfred, SVH and RMH up to a third of patients were planned elective admissions.

Table 55: Type of admission for census patients

		Emergency Admission	Elective Admission	Intended Non Same Day
		(% of total patients in each subgroup)		
Alfred	GM	97	3	97
	SM	72	27	96
ARMC	GM	99	1	100
	SM	93	7	89
MMC	GM	100	0	100
	SM	97	3	100
RMH	GM	99	1	100
	SM	70	30	94
SVH	GM	89	11	98
	SM	67	33	98
All	GM	97	3	99
	SM	81	19	95

6.2.9 Where are patients admitted from and where are they admitted to within the organisations?

For GMU patients, 90% were admitted from home or hostel accommodation, whilst for SMUs, 91% were admitted from home or other hospitals. A higher proportion of patients who lived in Hostels (low level aged residential care) rather than Nursing Homes (high level aged residential care) were admitted to all hospitals under the GMUs.

Table 56: Location from where census patients were admitted (% in each subgroup)

		Home	Hostel	Nursing Home	Respite Care	OPD	Drs Rooms	Other Hosp	Other
Alfred	GM	72	19	0	6	3	0	0	
	SM	78	3	1	1	1	1	14	
ARMC	GM	78	12	4	1	0	0	4	
	SM	89	4	2	1	2	0	3	
MMC	GM	69	19	7	2	0	0	2	2
	SM	84	5	4	0	2	1	4	
RMH	GM	82	11	2	1	0	0	4	
	SM	77	1	1	0	3	2	13	4
SVH	GM	77	8	6			0	6	4
	SM	66	4	0			2	23	4
All	GM	77	13	4	2	0.3	1	3	1
	SM	80	3	2	0.5	2	1	11	1

When patients were admitted to The Alfred, SVH, RMH and ARMC, the majority of the patients from SMUs (69% to 78%) were co-located together in a ward established to manage patients with this particular system condition (eg renal ward or cardiology ward). General medical unit patients were less likely to be physically co-located in a ward especially for GMU patients (40% - 66%). Monash did not allocate patients to specific areas and an analysis of where patients were located was not undertaken.

Table 57: Proportions of census patients located in their unit's home ward or in HITH

Gender	Alfred		ARMC		MMC		RMH		SVH		All	
	(% total patients for either GMU or SMU at each hospital)											
Located in	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
- home ward	64	77	40	49	n/a	n/a	51	76	66	78	53	75
- HITH	0	6	5	18	0	10	4	2	0	7	2	9

n/a=not applicable

6.2.10 Co-morbidities

The Charleson Index was used to examine the number of specific co-morbidities for each patient[35]. Previous short term illness which had completely resolved (eg. pneumonia) or operative procedures for conditions which were no longer active were not considered in this process. The Charleson Index measures the presence of 19 physical co-morbid conditions but it does not include psychiatric co-morbidities (see Appendix 2 for co-morbidity definitions from Charleson Index)[35]. The 19 items have a weighting assigned to form the Index. The range of scores which are theoretically possible is from 0 – 33. The highest score attained by any patient in this dataset was 13.

Table 58: Charleson Index Score of co-morbid diseases for census patients

	Alfred		ARMC		MMC		RMH		SVH		All	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
mean	2.9	3.5	2.1	2.9	2.5	2.1	2.0	2.2	1.8	2.2	2.2	2.5
median	2	3	3	3	2	2	1	2	2	1	2	2
SD	2.8	3.1	1.5	2.4	2.1	1.7	1.7	2.2	1.8	2.6	1.9	2.4

Further analysis of co-morbid conditions, which were actively contributing to the present illness, did not provide any further differentiation between either sites or units.

6.2.11 Social Factors

One of the factors, thought to contribute to the length of stay in hospital, was the supporting social network of patients. One social factor directly addressed in the census was whether the patients lived alone. At all hospitals a higher proportion of patients admitted to the care of GMUs lived alone when compared to SMUs. There were particularly high numbers of patients who were admitted to GMUs at ARMC who lived alone, whereas the SMU patient group at ARMC and MMC had the lowest proportion of patients who lived alone.

Table 59: Proportion of census patients living alone

	GM	SM	ALL
	% of total patients in each subgroup		
Alfred	39	32	33
ARMC	46	16	26
MMC	26	16	19
RMH	31	21	25
SVH	36	34	34
All	35	24	

The medical staff rated the patients on whether they considered there were any social factors which would lead to a longer than usual length of stay in hospital.

Approximately 50% of GMU patients were rated as having social factors which would influence LOS, whereas less than 30% of the SMU patients were similarly rated. It is apparent from comparing the information in the following table with that from the previous one that the medical staff were not automatically categorising 'living alone' as a social factor which prolonged LOS.

Table 60: Number and proportion of census patients with potential social issues affecting LOS

	GM	SM	ALL
	n, (% of patients identified as having social issues for each subgroup)		
Alfred	19, (53%)	41, (27%)	60, (32%)
ARMC	40, (60%)	45, (34%)	85, (43%)
MMC	27, (50%)	41, (30%)	68, (36%)
RMH	35, (42%)	26, (20%)	61, (29%)
SVH	27, (51%)	33, (36%)	60, (41%)
ALL	148, (50%)	186, (29%)	

If social issues were identified as potentially prolong LOS, then the medical staff were asked to indicate which social problems were likely to prevail for each patient. Sixteen different social problems were identified, of which 7 were most common across all the hospitals. Patients could have more than one social problem identified as a factor which may increase their LOS beyond recovery from illness.

Table 61: Identification of type of social issue affecting LOS for census patients

	Alfred		ARMC		MMC		RMH		SVH		ALL	
	n, % of patients identified as having social issues influencing LOS											
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Lives Alone	8, 42%	17, 40%	19, 48%	18, 40%	8, 30%	10, 24%	15, 43%	8, 31%	12, 44%	16, 48%	62, 42%	69, 37%
Increased Dependency	4, 21%	4, %	18, 45%	14, 31%	5, 19%	5, 12%	11, 31%	2, 8%	2, 7%	1, 3%	40, 27%	26, 14%
More Home supports to be arranged	4, 21%	6, 14%	13, 33%	13, 29%	10, 37%	21, 51%	10, 29%	9, 35%	12, 44%	16, 48%	49, 33%	65, 35%
Carer Issues		5, 12%	3, 8%	6, 13%	2, 7%	6, 15%	1, 3%	4, 15%	2, 7%	2, 6%	8, 5%	23, 12%
Residential Placement issues			7, 18%	2, 4%	9, 33%	4, 10%			2, 7%	1, 3%	18, 12%	7, 4%
Dysfunctional Family Relationships		3, 7%	2, 5%	5, 11%	1, 4%	3, 7%	1, 3%	2, 8%	1, 4%	1, 3%	5, 3%	14, 8%
Homeless	3, 16%	8, 19%		1, %			1, 3%			1, 3%	4, 3%	10, 5%

6.2.12 Severity of Illness and Patient Orientation

6.2.12.1 Severity of Illness

To estimate the severity of each patient's illness, the Duke Severity of Illness Visual Analogue Scale (DUSOI) was used[36]. For each patient, the junior medical staff (i.e. registrar in most instances) caring for the patient were asked to consider the severity of the patient's current illness, including all health problems. They were then asked to mark a 100 mm line with one end (0) anchored by lowest level of severity and the other by highest level of severity (100). A definition of lowest and highest levels of severity was provided to the medical staff on each occasion.

Mean DUSOI values for GMUs at SVH and The Alfred were higher when compared to SMUs whereas for the other three hospitals the reverse was seen. At RMH, the mean was much lower value for GMU patients than all the other GMUs or SMUs. When an overall mean was calculated, there was minimal difference between GMUs and SMUs.

Table 62: Duke Severity of Illness visual analogue scores for census patients

	Alfred		ARMC		MMC		RMH		SVH		All	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
Mean	58.2	55.7	55.4	59.1	51.6	53.5	43.5	53.9	59	51.6	52.3	55
Median	60	60	55	61	49	55	35	56	65	50	52.5	57
SD	22.7	23.7	20.5	22.4	19	25.9	25.7	24	20.3	23.4	22.8	24

6.2.12.2 Patient Orientation

A screening test for patient cognitive ability was used. Registrars and residents were asked whether a patient was oriented to time, place and person. This measure is likely to have reasonably high specificity and lower sensitivity than a formal test.

Apart from SVH, there were much higher proportions of patients who were orientated under the care of the SMUs than in the GMUs. For three GMU patients at RMH, the response was "unable to assess" due to language difficulties and they have been excluded from the table below.

Table 63: Proportion of census patients who were orientated in time, place and person

	Alfred	ARMC	MMC	RMH	SVH	All
GM	64	57	48	64*	87	64
SM	91	88	79	96	86	88

* 3 patients were unable to be assessed

6.2.13 Functional status and level of care required

6.2.13.1 Functional Status

The functional status of the patients was assessed using the Nottingham ADL Scale[37]. This is based on the level of personal assistance patients require to complete 10 functional tasks. Each task had the same level of scoring and patients were considered to require minimal assistance if they scored 5 or more. All SMUs averaged a score above 6 and most had a median score of 10, whereas at ARMC and MMC, the patients in GMUs had average and median scores below 5. The indication from this is that more nursing assistance was required for patients in GMUs.

Table 64: Functional status scores for census patients

		Alfred	ARMC	MMC	RMH	SVH	All
GM	mean	5.6	4.3	4.3	5.6	6.0	5.1
	median	5	3	3	4.5	7	4
	SD	3.9	4.3	3.9	3.8	3.7	3.9
SM	mean	7.3	6.7	6.6	8.1	6.8	7.1
	median	10	10	10	140	9	10
	SD	3.7	4	4	3.1	3.8	3.8

6.2.13.2 Patient Nursing Care Needs

This assessment scale measured patient care nursing needs in 14 domains and was adapted to include a domain on behaviour from a scale published by Clini, Vitacca and Ambrosino (1999)[38]. The scoring range was from 0 to 51 if the patient had a tracheostomy. No patients included in the census study had tracheostomies, so the maximum possible score was 49. Scores of less than 10 indicated that the patient was essentially self-caring. The following table corroborated the assistance pattern demonstrated in the functional status score seen in the previous table.

ARMC, MMC and SVH had average scores above 10 for GMUs and the overall score for GMUs was also above 10, indicating more nursing assistance was required. However for SMUs the highest average score was at ARMC at 7.8 and the overall average score for SMUs was 6.7.

Table 65: Census patient nursing care needs scores

		Alfred	ARMC	MMC	RMH	SVH	All
GM	mean	9.9	10.7	11.4	9.3	10.2	10.3
	median	9.0	12.0	10.6	8	8.5	9
	SD	7.3	7.6	7.7	6.8	8.1	7.4
SM	mean	5.7	7.8	7.4	5.4	7.4	6.7
	median	3.0	5.0	5.0	4	6.0	4
	SD	6.6	7.7	7.2	4.7	6.5	6.7

6.2.14 Allied Health Treatment

Physiotherapy, one of the largest allied health departments in acute public hospitals provided the majority of the patient services for these patients. The data were collected from the electronic statistical systems in place in each hospital for allied health and only the number of patient contacts and the direct patient contact time was used in this analysis. Other times relating to patient meetings, group sessions, clinical meetings, service organisation and teaching and research were excluded. Only the five largest service providers in allied health were included in this project – i.e. Physiotherapy(PT), Occupational Therapy (OT), Social Work (SW), Nutrition (NUT) and Speech Pathology (SP). At The Alfred, allied health service delivery overall appeared to be low in GMUs but comparable for SMUs. Excluding The Alfred, physiotherapy services were provided to more than a third of all GMU patients whereas less than 30% of SMU patients were provided with physiotherapy services. At SVH, the social work department provided services for a higher proportion of GMU patients in comparison to the other hospitals.

Table 66: Proportion of census patients treated by Allied Health Staff

		PT	OT	SW	NUT	SP	Cumulative % of census patients treated by AH staff
Alfred	GM	22	6	11	14	6	39
	SM	20	9	18	18	8	49
ARMC	GM	49	10	18	37	13	73
	SM	27	10	11	15	1	43
MMC	GM	44	20	13	13	6	57
	SM	28	6	16	14	9	47
RMH	GM	36	10	5	15	10	51
	SM	17	6	17	13	2	40
SVH	GM	38	8	34	21	9	66
	SM	29	18	17	14	5	47

From the amount of direct patient contact time recorded, an average time (in minutes) has been calculated for each hospital's GMU and SMU patients. The average total treatment time provided by all five services is presented in the last column of the next table. The time provided was very variable between the different service providers and across hospitals.

Table 67: Average direct contact treatment time provided per patient per day by Allied Health

		PT	OT	SW	NUT	SP	All 5 depts
		Mean treatment time (in minutes)					
Alfred	GM	27	48	35	36	13	48
	SM	34	81	80	40	38	80
ARMC	GM	40	24	43	28	31	61
	SM	44	63	39	39	30	66
MMC	GM	26	48	41	31	43	58
	SM	30	41	41	17	35	50
RMH	GM	30	24	45	30	51	48
	SM	38	60	41	28	33	54
SVH	GM	43	35	69	29	46	80
	SM	43	42	48	31	18	73

6.2.15 Discharge Factors

6.2.15.1 Ready for discharge

The medical staff were asked to decide whether patients were medically ready to be discharged from acute hospital care on that day. At most of the hospitals, only about 30% of all patients were ready for discharge on census day. However there were large differences between hospitals and between GMU and SMU patients. Of those patients identified as ready for discharge, less than 30 percent of GMU patients were discharged (except at SVH), whereas at a minimum 45 % would be discharged from the SMUs.

Table 68: Proportion of census patients who were medically ready for discharge and proportion of patients for whom discharge was planned that day.

		Alfred	ARMC	MMC	RMH	SVH	All
Ready for discharge	GM	36	37	31	52	17	37
	SM	17	24	24	17	26	21
If ready, will they be discharged today	GM	29	28	24	25	56	29
	SM	46	55	75	59	63	61

For patients medically ready for discharge, over 80% of them were expected to go home, 8 % to a nursing home, 12% to a hostel, 4% to rehabilitation and 6% to other hospitals.

6.2.15.2 Not ready for discharge

For those patients who were not medically ready for discharge, the staff were asked to identify the principal activity which the patient would be undertaking on that day. This identified that for approximately 70 % of patients, the principal activity was treatment, for over 20% it was having a diagnostic test or procedure to assist with patient care and that 6% were waiting for a treatment or procedure to commence. The remainder of the patients were either undergoing initial assessment and or were terminally ill (~2% each).

6.2.15.3 Medically ready for discharge but will not be discharged

For those patients who were ready for discharge but would not be discharged, the staff were asked to identify why the patient was remaining in hospital. This resulted in 14 different responses. Several categories have been collapsed together for reporting.

The reasons for waiting can be divided into two groups, those which are external to the hospital (eg residential accommodation) and internal the hospital (eg. waiting for results to be available).

By far the greatest numbers of patients were either waiting for residential placement to become available or to be arranged. The other external activity was “waiting for home supports to be organised or to be put in place”.

The remaining categories were all issues of internal arrangements within each organisation, for instance the turnaround time on tests or clinical consultations. For some patients who were ready to go home, medical and other consultations were organised as an in-patient to provide ease of access for the patient as an alternative to an additional outpatient visit.

Table 69: Reasons identified for why census patients who were medically ready for discharge were still waiting in hospital (% of patients in each subgroup)

		Placement issues	Acute Medical Consult	ACAS consult	Allied Health Consult	Rehab consult	Home Supports needed	Outcome of tests	Other
Alfred	GM	90					10		
	SM	43	21		7		29		
ARMC	GM	67	11	22					
	SM	36	14	7	7	14	7	7	7
MMC	GM	54	8	8	23	8			
	SM	50		25		13		13	
RMH	GM	58	6	15		3	6	9	3
	SM	44	11		22		11		11
SVH	GM	0	50	25	25				
	SM	56				11		11	22
All	GM	60	9	14	5	3	4	4	1
	SM	44	11	6	7	7	11	6	2

6.3 Census Data Inferential Statistical Analyses

Census data were analysed to determine whether specialist medical units had systematically shorter duration of stay (DOS) than generalist medical units. Firstly an analysis was undertaken to determine which factors where associated with risk of admission to a SMU or GMU.

Potentially risk factors for increased DOS were first tested individually for association with admission to SMUs by logistic regression. Adjustment was made for differing proportions of patients in SMUs across the five hospitals. Selected factors with p-values <0.2 are listed below. The odds-ratio for admission to SMUs associated to each factor was also tested for dependence on the hospital, but no significant effects were found, so the results from all hospitals were pooled.

Odds ratios for ordinal variables (eg. age, Duke severity of illness score) are given "per point", so that the OR for an age difference of 3 years is the cube of the OR for a difference of 1 year.

Patients living alone were only half as likely to be admitted into SMUs than GMUs and patients who were not orientated are 78% less likely to be admitted to SMUs. By contrast, for every point on the functional status score, patients were 14 % more likely to be admitted to an SMU – that is the more functionally independent the patients are the more likely they are to be admitted to an SMU.

Table 70: Univariate analysis of factors associated with admission to SMUs from census

Factor	OR	95% CI	p-value
Lives alone	.54	[.39,.73]	<.0005
Has potential social factors which may prolong LOS	.40	[.30,.53]	<.0005
Not oriented	.22	[.16,.31]	<.0005
Age > 70	.18	[.13,.25]	<.0005
Age	.94	[.93,.95]	<.0005
Patient nursing care needs	.93	[.91,.95]	<.0005
Functional score	1.14	[1.11,1.19]	<.0005
Duke severity of illness score	1.004	[.998,1.01]	.185
Number of active co-morbidities	.87	[.78,.97]	.012

6.3.1 Multivariate analysis

The factors from the previous table were then combined in a multivariate regression (including adjustment for hospital, which is not shown in the following table). The multivariate analysis demonstrated the independent impact of each factor on the likelihood of admission to SMU. Thus when the factors were combined, patients who were not oriented were only half as likely to be admitted to SMUs as they were to be admitted to GMUs.

Table 71: Multivariate factors associated with SMU admission from census

Factor	OR	95% CI	p-value
Lives alone	.70	[.48,1.02]	.066
Has potential social factors which may prolong LOS	.71	[.49,.1.02]	.067
Not oriented	.50	[.32,.78]	<.0005
Age > 70	omitted		NS
Age	.95	[.94,.96]	<.0005
Patient nursing care needs	.95	[.92,.98]	<.0005
Functional score	omitted		NS
Duke severity of illness score	1.01	[1.003,1.02]	.006
Number of active co-morbidities	omitted		NS

6.3.2. Predictors of Long DOS

In order to examine whether cognitive status, social factors and measures of severity and complexity of illness were associated with a longer DOS, an analysis of these factors in relation to day of stay was undertaken. Significant or near-significant association of the factors from the last table with admission to SMUs implies that these factors may confound the effect of unit type on DOS. Hence they were included with unit type as independent variables in a logistic regression for DOS greater than or equal to 14 days. Three factors, 'lives alone', 'Age >70' and 'function score' were omitted when they were shown to be not significant.

Table 72: Multivariate analysis of factors where DOS greater than 14 days for census patients

Factor	OR	95% CI	p-value
Has potential social factors which may prolong LOS	2.89	[2.04,4.09]	<.0005
Not oriented	1.96	[1.26,3.07]	<.0005
Age	.98	[.97,.99]	<.0005
Patient nursing care needs	1.03	[1.00,1.06]	.055
Duke severity of illness score	1.01	[1.004,1.02]	.003
Number of active co-morbidities	1.14	[1.00,1.29]	NS
Specialist unit	1.04	[.70,1.55]	.839

This analysis was then repeated with DOS greater than or equal to 21 days as outcome and the only effect was that cognition and severity of illness were no longer significant predictor variables. There was no evidence that unit type was associated with stay beyond 14 or 21 days. It is interesting to note that with either the 14 or 21 day threshold, greater age was associated with a shorter stay after adjustment for other factors.

6.3.3 Negative Binomial Regression

Negative-binomial regression was used to test for association with overall DOS, as the data were significantly over-dispersed relative to a Poisson model. The general pattern of results was similar to those seen above using logistic regression. This confirms the robustness of the associations already identified.

Table 73: Association of factors with duration of stay for census patients

Factor	Ratio of Means	95% CI	p-value
Lives alone	omitted		NS
Has potential social factors which may prolong LOS	1.89	[1.65,2.16]]	<.0005
Not oriented	1.34	[1.12,1.60]	.001
Age > 70	omitted		NS
Age	.99	[.986,.994]	<.0005
Patient nursing care needs	omitted		NS
Function score	.98	[.96,1.00]	.025
Duke severity of illness score	1.006	[1.003,1.008]	.0005
Number of active co-morbidities	1.07	[1.02,1.12]	.009
Specialist unit	.99	[.85,1.14]	.843

6.3.4 Other associations

Social factors potentially affecting length of stay were significantly more likely to be found in patients who were judged as not oriented: OR=4.33, 95% CI [3.08,6.10], p<0.0005. All estimates are by logistic regression of pooled data after adjusting for the hospital effect.

The odds of a patient, who was medically ready for discharge, being discharged on the same day were significantly higher for patients in SMUs: OR=3.50, 95%CI [1.99,6.16], p<0.0005. Among patients assessed as being not medically ready for discharge, SMU patients were not significantly more or less likely to be waiting for treatment or tests: OR=1.26, 95% CI [.58,2.71], p=0.56.

6.4 Summary

Nearly all medical multi-day in-patients are admitted as an emergency admission with some variability in admissions under SMUs. Most of the patients are admitted from home with a reasonably high proportion admitted from hostels. Few patients were admitted from nursing homes.

Most medical in-patients were elderly (approximately 50% > 70 yrs of age). More of these elderly patients were managed in GMUs rather than SMUs. The range of conditions managed was extremely diverse, however the larger proportion of primary DRGs were accounted for by conditions affecting the respiratory and cardiovascular systems. The current management practices for the distribution of patients between SMUs and GMUs resulted in older patients with multiple problems, impaired cognition and social factors affecting DOS being admitted to GMUs rather than SMUs.

The proportion of in-patients who have been admitted in the last month, or who have had more than 3 admissions in the last 12 months was quite high. The characteristics of this group warrant closer examination to determine whether there are opportunities to minimise the requirement for recurrent admission, either by better discharge planning or examination of opportunities for care coordination to improve community-based management.

The distribution of DOS data identified an important theme; that there was a skewed distribution and that average figures were likely to be misleading. One of the hospitals did not have a large discrepancy between mean and median DOS suggesting that the distribution of DOS at this hospital was not so highly skewed. An examination of differences in the process of care and/or access to subacute or aged residential care may be warranted to determine whether these factors are relevant to improving performance at other hospitals. GMUs are no less efficient than SMUs on the basis of DOS, when variables such as impaired cognition and social factors were taken into account.

Social factors were identified by medical and nursing staff as likely to affect LOS for a high proportion of patients, more so for GMUs rather than SMUs. The specific factors identified included the fact that many patients lived alone, some go home with a higher level of dependency, and that additional home and carer supports were required for people returning to home. Residential placement issues for people unable to return home were also of importance.

Patients in SMUs have better physical function, lower levels of impaired cognition and required less nursing care than GMU patients. Apart from The Alfred where AH usage was low, more than 60% of GMU patients utilised the services of AH staff whereas about 45% of SMU patients utilised these services.

A higher proportion of patients in GMUs were identified on census day as being medically ready for discharge, than in the comparable SMUs, however a smaller proportion of such patients were actually discharged from GMUs rather than SMUs on that day. A patient in a SMU who is medically ready for discharge is 3.5 times more likely to leave hospital on that day than a medically ready patient from a GMU. The disoriented patient was more likely to have social factors affecting LOS, suggesting that the needs of this group in particular in relation to discharge planning presented a challenge.

A multiple logistic regression analysis of factors responsible for a patient being present in hospital beyond the 13th day of their in-patient episode of care suggested that this was most likely to be accounted for by social factors and impaired cognition and patient nursing care needs. After adjustment for these factors, age was less likely to be associated with a LOS beyond the 13th day.

For the patients who were medically ready for discharge, the majority were expected to go home, however 20% were discharged to either a nursing home or hostel and a relatively small proportion were waiting for discharge to either rehabilitation (4%) or another hospital (6%). Thus availability of appropriate high and low intensity supported residential care was a key issue for consideration when examining opportunities for improved efficiency in managing the in-patient episode for this group of patients. For those people who were waiting to go home the key issues were the availability of additional home and carer supports. The issue of managing the delays resulting from internal processes appeared to be a relatively minor albeit important issue by comparison.

The input to direct patient care by the AH professions varied greatly between hospitals. At ARMC, 73% of GMU census patients received direct patient care from AH whereas at The Alfred, this was so for only 39% of GMU census patients. The average daily time spent with patients by each of the AH professions also demonstrated great variability between hospitals and between GMUs and SMUs. At SVH, for the GMU patients who were treated by AH, the average daily contact time was 80 minutes and contrasted with the 48 minutes of time provided on average for GMU patients at both The Alfred and RMH. For SMU, the same extent of variability was seen between hospitals but overall, more AH time was allocated to SMU patients than GMU patients. The increase level of daily contact by AH at SVH may be one of the key factors contributing to fewer patients (both GMU and SMU) having long durations of stay at this hospital.

7. Outcomes from Study 3 - Cohort Study

The aim of the cohort study was to study the clinical management of 150 patients consecutively recruited from the five hospitals. Recruitment commenced on 17 September and was completed on 20 October 2000. It was based on the patient presenting with one of 3 specified conditions; exacerbation of chronic obstructive pulmonary disease, (COPD) congestive cardiac failure (CCF) and unstable angina (UA). It was anticipated that 5 patients with each of these condition who were admitted to the care of GMUs and 5 admitted to the care of SMUs at each hospital would be recruited in this time period. However, there was a variable outcome between the hospitals in patient presentation and ability to recruit. The recruitment period at MMC was extended by 1 week so that the number of patients could be increased to the level of other hospitals.

Ten patients, 6 with CCF (3 from each of GMU and SMU), 2 COPD from GMU and 2 UA from SMU had not been discharged at the conclusion of data collection. During the course of the study period 8 patients, all with UA, proceeded to surgery for coronary artery bypass grafting. The LOS for these patients also included the post-operative period. There were two UA patients still in hospital at the end of data collection.

7.1 Results

Table 74: Recruitment levels in cohort study

Hospital	Patient Condition	Recruited			Not recruited	Total
		GM	SM	Total		
Alfred	COPD	1	5	6	6	12
	CCF	3	2	5	14	19
	UA	2	5	7	11	18
ARMC	COPD	5	7	12	6	18
	CCF	5	5	10	4	14
	UA	2	6	8	1	9
MMC	COPD	5	2	7	8	15
	CCF	2	5	7	9	16
	UA	1	5	6	4	10
RMH	COPD	5	0	5	6	11
	CCF	4	2	6	13	19
	UA	5	5	10	5	15
SVH	COPD	5	0	5	1	6
	CCF	5	4	9	0	9
	UA	0	6	6	2	8
Total		50	59	109	90	199

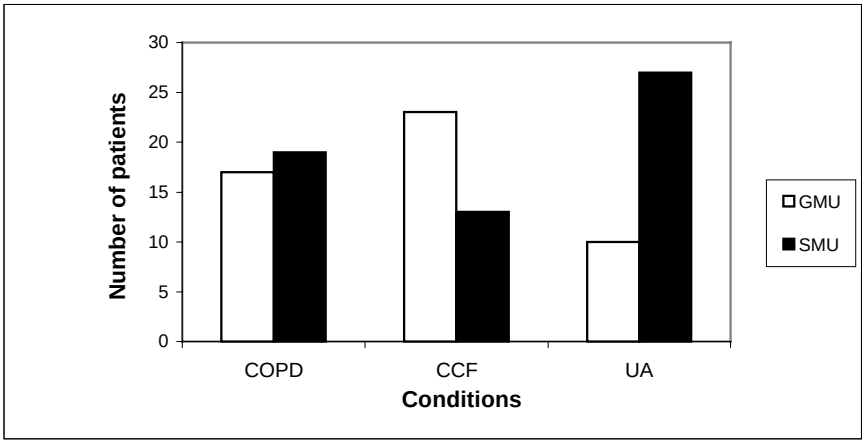
From the total admissions with these conditions, 55% were recruited to the study. For specific conditions the recruitment rate varied – 49%, 61% and 69% for COPD, CCF and UA respectively.

There were four reasons for not being enrolled in the study :

- patients were unwilling to participate;
- patients unable to participate (usually because they could not understand the plain language statement which was only available in English);
- patients were either admitted directly, or shortly after arrival, to ICU and could not be interviewed and
- patients were not recruited within 48 hours of admission – either because of Friday night/Saturday morning admission or because the patient's junior medical staff did not have time to provide assessment information from the initial 48 hour period.

Each hospital had at least one patient group with a low recruitment number. Therefore for analyses, the patient groups were aggregated into the two categories of GMU or SMU with no reference to hospital.

Figure 4: Patient numbers recruited in the cohort study for each condition



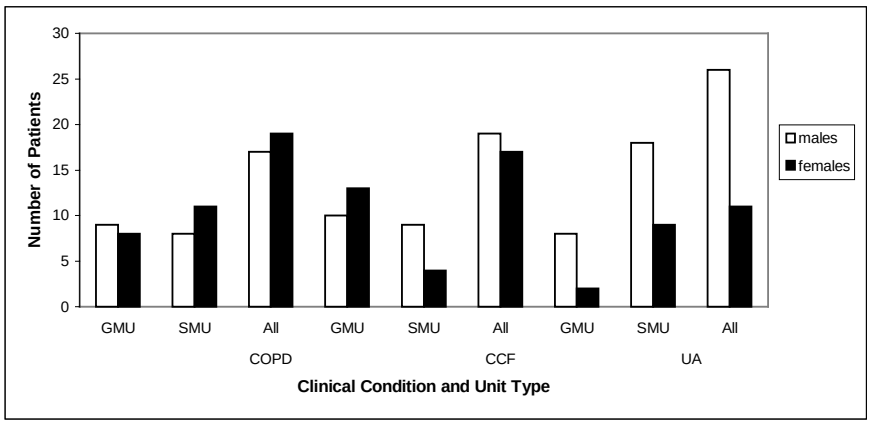
7.1.1 Subject Demographics

The demographics of the sample collected in this phase of the study were reflective of both the VAED and census data. Older patients were seen in GMUs and more males were seen in both GMUs and SMUs for CCF and UA, with a slightly higher number of females seen in COPD.

Table 75: Age distribution for each condition in the cohort study

	COPD			CCF			UA		
	GM (n=17)	SM (n=19)	ALL (n=36)	GM (n=23)	SM (n=13)	ALL (n=36)	GM (n=10)	SM (n=27)	ALL (n=37)
Mean (years)	72.9	67.3	70	78.1	71.4	75.7	72.9	64.3	66.6
median	76	69	72	79	72	77.5	73	65	68

Figure 5: Gender distribution by condition from the cohort study



7.1.2 Administrative Characteristics

7.1.2.1 Previous Admission

In the last 12 months, 73% of CCF patients had a previous admission whereas only 51% and 45% of COPD and UA respectively, had been admitted in this period. A level of 3 or more admissions in the previous 12 months was considered to indicate a high re-admission rate. From this patient group, 9 patients (27%) with CCF, 7 patients (20%) with COPD and 2 patients (6%) with UA were in this group.

7.1.2.2 Elective or Emergency Admission

Of the 109 patients included in the study, 108 were admitted as an emergency admission. Only one patient admitted to ARMC with COPD was classified as a planned elective admission.

7.1.2.3 Length of Stay

The LOS of those patients who were discharged by the end of the data collection period is presented in the following table. The LOS in the 2 chronic conditions, CCF and COPD is much longer in GMU than SU. However a similar LOS were seen in patients with UA.

Table 76: Length of stay of cohort study patients discharged from hospital

	COPD			CCF			UA		
	GM (n=15)	SM (n=19)	ALL (n=34)	GM (n=20)	SM (n=10)	ALL (n=30)	GM (n=10)	SM (n=25)	ALL (n=35)
mean	8.3	6.0	7.0	8.8	4.1	7.2	6.5	6.6	6.6
median	7	4	5	8	4	6	4	3	3

7.1.3 Clinical Characteristics

The clinical picture of each patient's condition was drawn from interviewing both patients and staff caring for these patients.

7.1.3.1 Patient Responses

7.1.3.1.1 Social Factors

Patients were asked to identify where they lived and whether they lived alone. The proportion of people who lived alone was much higher in GMUs than in SMUs. This pattern of social support confirmed the findings from the census data.

Table 77: Proportion of cohort study patients who stated they lived alone

	CCF	COPD	UA	All units
GM patients	48%	41%	30%	43%
SM patients	15%	16%	33%	23%

Patients were admitted from home most commonly (72%). For the three diagnoses, there was an even spread of the response scores from this choice. The second most common choice selected by the patients was living in a hostel. Patients with CCF and COPD appeared to have a requirement for more supervised support than those with UA.

Table 78: Proportion of cohort study patients who stated they lived in a hostel

	CCF	COPD	UA	All units
GM patients	13%	18%	0	12%
SM patients	8%	11%	0	5%

The number of patients who stated that there were people living at home who were dependent upon them was very small, 11 in total. Eight were from The Alfred with 5 in the COPD group and 3 with UA, all under the care of the specialty respiratory or cardiology units respectively.

7.1.3.1.2 Patients' perceptions of the severity of their presenting illness

Patients were invited to rate the severity of their illness on a 3 point Likert scale of mild, moderate and severe. The most common rating was severe. This rating level was chosen by 61% of all patients. It was interesting to note that this rating was the choice of a higher proportion of SMU patients.

Table 79: Proportion of census patients rating themselves as severely ill

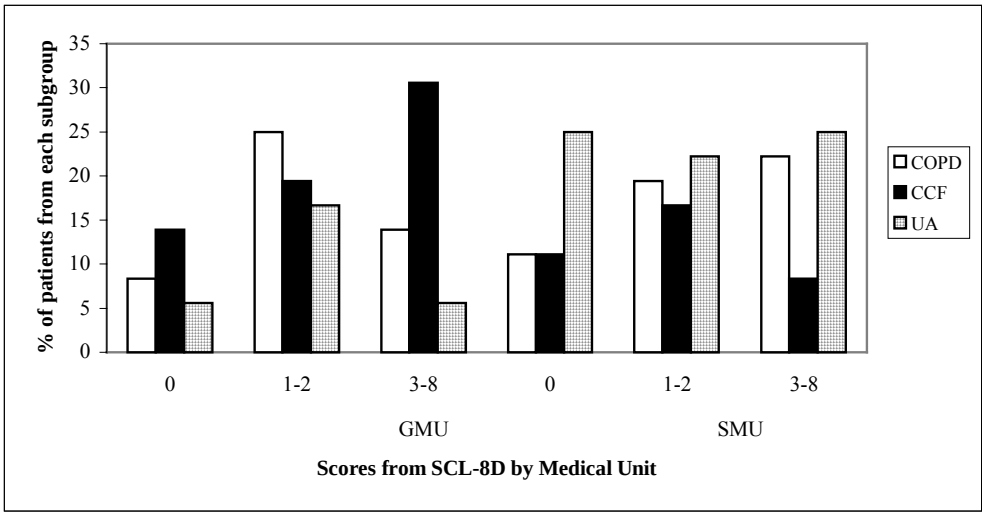
	CCF	COPD	UA
All patients	64%	81%	38%
GM patients	57%	76%	33%
SM patients	77%	84%	39%

When patients were asked to identify the illness or problem that brought them into hospital, the most common response across all conditions was the symptom of breathlessness, with 40% describing this as the problem underlying their admission. However a few patients in the GMU group, (3 with CCF and 1 with COPD) were unaware of any particular problem or illness which might have led to their admission.

7.1.3.1.3 Likelihood of Psychiatric Co-morbidity

To screen for the presence of psychiatric co-morbidity, an 8 item screening tool the SCL-8D was used[39]. This instrument was developed in a Scandinavian community population derived from the depression and anxiety sub-scales of the longer SCL-90[39]. Each question has a yes/no response and is scored with one point leading to an overall possible score of 8. The overall outcome demonstrated that 25% had no positive responses, 40% scored either 1 or 2 points and 35% 3 to 8 points. The significant feature of figure 6 is the higher rating of GMU patients with CCF.

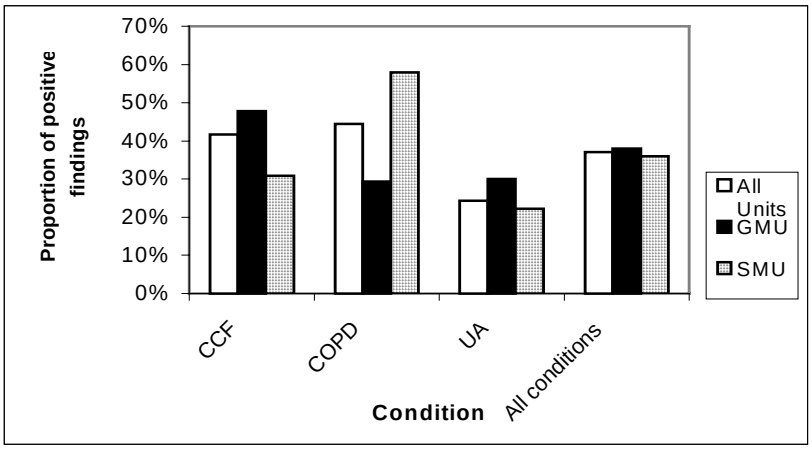
Figure 6: Likelihood of the presence of psychiatric co-morbidity in patients in the cohort study



7.1.3.1.4 Likelihood of Depression

Using the Brief Case-Find for Depression tool (a 4 item screening instrument) all patients were rated on the potential for clinical depression[40]. Overall 40 patients (37%) were likely to be depressed. When divided into the subgroups of GMU and SMU, the potential for clinical depression was present in 19 (38%) and 21 (36%) respectively.

Figure 7: Proportion of positive findings for depression in the cohort study



7.1.3.1.5 Cognitive Function

A shortened version of the Mini Mental State Examination (MMSE) was used to assess patients' cognitive function[41-42]. The language section was omitted. The test was administered within 48 hours of admission to hospital. It was not re-administered, in line with the recommendations made by Professor Folstein concerning the appropriate frequency of administration[43].

The areas of orientation (max score 10), registration (maximum score 3), recall (maximum score 3), attention and calculation (maximum score 5) were assessed. A total possible score from this modified test is 21. There were small non-significant differences between the groups. Some subjects scored poorly on all parameters.

Table 80: Measurement of cognitive function from cohort study patients

	GM				SM			
Variable	Mean	Median	SD	Range	Mean	Median	SD	Range
Orientation	8.96	9	1.26	4-10	9.12	10	1.49	3-10
Registration	2.96	3	0.2	2-3	2.98	3	0.13	2-3
Recall	2.06	2	1.08	0-3	2.38	3	0.88	0-3
Attention and Calculation	3.32	4	1.62	0-5	3.66	4.5	1.64	0-5
Total modified MMSE	17.3	18	2.7	8-21	18.1	19	3.0	9-21

7.1.3.2 Clinical Staff Responses

7.1.3.2.1 Number of prescribed medications on admission

On admission to hospital, one surrogate measure for the complexity of illness is the current number of prescribed medications. Whilst there were differences between the groups, they appeared to be small and not clinically significant. Overall both GMU and SMU patients had a large number of prescribed medications. Data were not collected on the level of non-prescription medication that may be taken by patients.

Table 81: Average number of medications used on admission by cohort study patients

	GM			SM			All Units		
	CCF	COPD	UA	CCF	COPD	UA	CCF	COPD	UA
Mean	7.3	7.2	6.4	6.5	7.9	5.2	7.0	7.6	5.5
Median	6	6	7	6.5	7	5	6	6.5	5
SD	3.8	2.9	3.7	2.6	3.9	2.6	3.4	3.4	2.9

7.1.3.2.2 Active Co-morbidities

Only small differences in the number of active co-morbidities listed for each patient were evident between the conditions. More co-morbidities were listed with the 2 cardiac conditions, CCF and UA.

Table 82: Average number of active co-morbidities for cohort study patients

	GM			SM			All Units		
	CCF	COPD	UA	CCF	COPD	UA	CCF	COPD	UA
Mean	2.8	2	2.2	3.2	1.5	2.8	2.9	1.7	2.7
Median	3	2	1	3.5	1	4	3	2	3
SD	1.7	1.1	2.0	2.0	2.1	2.1	1.8	1.7	1.96

7.1.3.2.3 Did the medical staff consider there were any social factors which could affect the hospital length of stay?

A much higher proportion of the patients under the GMUs were rated by medical staff as having a social factor or factors, which could influence the LOS for the patient concerned.

Table 83: Proportion of cohort study patients rated as having social factors influencing LOS

	CCF	COPD	UA	All units
All patients	36%	39%	19%	31%
GM patients	48%	59%	22%	47%
SM patients	15%	21%	18%	18%

For these patients, the most common problem was identified as living alone, followed by the need for more home supports to be in place, before patients would be able to go home.

In the following table, type of social factors and the proportion of patients with each of the particular social issues have been listed. The proportions have been developed using the number of patients who were identified with problems as the denominator and the number of social factors as the numerator. As patients could have more than one social factor, the overall percentages may be higher than 100%.

Table 84: Type of Social Factors identified as affecting LOS for cohort study patients

	GMs			SMs		
	CCF	COPD	UA	CCF	COPD	UA
Number of identified patients	11	10	2	2	4	5
Lives Alone	72%	60%	50%	50%	50%	20%
More home supports required	27%	30%	n/a	50%	50%	n/a
Change in the level of care required	18%	10%	n/a	n/a	n/a	n/a
Carer Issues	n/a	n/a	50%	n/a	25%	n/a
Dysfunctional Family relationships	n/a	10%	n/a	50%	n/a	20%
Need Guardianship Board	9%	n/a	n/a	n/a	n/a	n/a
Lives Interstate or overseas	n/a	10%	n/a	n/a	n/a	40%
Homeless	9%	n/a	n/a	n/a	n/a	n/a
Other (not specified)	9%	n/a	n/a	n/a	n/a	40%

n/a = not applicable

7.1.3.2.4 Functional Status

To assess the functional status of the patients in the study, the modified Barthel Index (BI) an 11-item scale of functional tasks was used[44]. Unfortunately at MMC, the data were incorrectly scored with the scoring completed at the end of each assessment, and no retention of the individual item score. It was therefore impossible to re-score the BI at the end of the study. The BI data reported here are from the other 4 hospitals. Within the BI, the question relating to stairs had some inconsistency in scoring the response. For some patients, this was scored as not applicable and this has been coded as a 0 score on that item for these patients.

The BI was assessed within 48 hours of admission (T1) and then re-assessed on the day of discharge (T2).

Table 85: Functional scores from the Barthel Index for cohort study patients

	GM						SM						All Units					
	CCF		COPD		UA		CCF		COPD		UA		CCF		COPD		UA	
Time of BI	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
n	18	14	15	12	9	4	10	7	14	12	22	19	28	21	29	24	31	23
Mean	77.8	90.4	74.2	88.2	89.6	92.0	69.7	86.6	86.6	89.8	86.0	89.8	74.9	89.8	80.2	89.0	87.0	90.3
Median	83	94	78	90	89	90	81	90	90	90	90	90	82.5	90	85	90	90	90
SD	23.3	14.0	20.2	9.0	7.7	4.5	29.9	10.5	10.5	7.1	15.0	6.8	25.6	12.2	17.1	8.0	13.3	6.3

To establish whether the groups for GMU and SMU were similar at the initial test, an analysis with a two independent group Student's t test was used. There were no statistically significant differences between GMU and SMU groups for CCF or UA but COPD was statistically significantly different ($p<0.05$).

When the outcome for the BI was compared from initial to discharge, most patients from each condition group improved, only 3 patients, one in each group had minor deteriorations in their functional status. Twenty patients did not have repeat BIs completed, 10 of whom were still in-patients at the completion of the data collection. When the paired samples in the remaining dataset were compared using a paired Student's t test, each patient group had a statistically significant level of improvement.

Table 86: Comparison between initial and discharge Barthel Index in cohort study

	CCF	COPD	UA
n (paired samples)	21	24	23
no. with no repeat BI	7	5	8
p-value*	<0.005	<0.005	<0.05

** paired Student's t test*

7.1.3.2.5 Patient Dependency

Throughout the cohort study period, a computer based patient nurse dependency system (Trend Care) was used to establish the amount of nursing time required per patient per 24 hour period[45]. It enabled the calculation of the average number of nursing hours per day required to provide quality nursing care. The results demonstrated that slightly more nursing hours per patient were required for SMU patients, especially in those with UA. The increased amount of time was largely due to the increased use of intravenous medication and a large difference in the number of transfers of these patients to other wards. This was a much more common practice for SMU than GMU patients, especially as much greater use of CCU was made with SMU patients. When compared using a Student's t test for independent groups, the UA groups had significantly more nursing hours per patient day at the level of $p<0.005$.

Table 87: Average nursing hours per patient day for cohort study patients

	GM			SM		
	CCF	COPD	UA	CCF	COPD	UA
Mean	3.3	3.7	3.5	4.3	3.8	6.2
Median	3	3.8	3.3	4.0	3.8	6.1
SD	1.3	10.	1.0	1.8	1.1	2.6

If all GMU patients were aggregated together, an average of 3.5 hours per patient day was indicated as the requirement for quality nursing care. However this was slightly under the estimate made by the program developers at 3.6 hours for general medical patients[46]. For cardiology patients, the average hours per patient day were 5.6, whereas the program developers estimated the requirement to be 3.9 hours.

In the UA group, 19 patients were admitted to Coronary Care (CCU) for some or all of their hospital admission, two were patients from GMU and 17 were patients from SMU.

7.1.3.2.6 Severity of Illness

The measurement of severity of illness used the Duke Severity of Illness (DUSOI) score[36]. This required the medical staff scoring the patient to have a good understanding of all the patients' health problems, how well each condition would respond to treatment and its influence on prognosis. Two approaches were used. One was to mark a 100mm visual analogue scale (VAS) anchored at one end by "lowest level of severity of illness" and at the other with "highest level of severity of illness". The second method used the DUSOI algorithm to develop a score (Score). This involved listing all the patients' health problems and scoring on 4 parameters. Unfortunately, when this was completed by the medical staff, several patients had no scoring for the main problem which had brought them into hospital and a few had no scoring for problems which were listed as active co-morbidities. Thus the DUSOI scores of 11 patients were considered invalid and omitted from further analysis.

Table 88: Measurement of severity of illness for cohort study patients using the DUSOI

	GM						SM					
	CCF		COPD		UA		CCF		COPD		UA	
	Score	VAS	Score	VAS	Score	VAS	Score	VAS	Score	VAS	Score	VAS
Mean	73.1	67.0	73.4	68.7	66.7	50.4	72.6	66.8	66.8	54.4	59.2	48.6
Median	70.5	71	72.5	70	64	47	73.5	66	70	65	63	49
SD	12.6	19.4	14.3	14	14.5	17.4	13.4	17.4	14.9	28.8	17.1	21

There were no significant differences between the groups on either VAS or DUSOI scores. The level of agreement between these items was tested using Cohen's kappa statistical test. Only moderate levels of agreement were seen in each condition (k=0.44 for CCF, k=0.653 for COPD and k=0.43 for UA).

7.1.3.2.6 Diagnostic Classification of Disease

There are common tools used to classify the level of severity of disease in patients with heart failure (CCF) and COPD. For CCF, the New York Heart Failure Classification (NYHC) Scale (from 1 – 5) was used and for COPD, the forced expiratory ratio (FER) which provided a measure of severity of airflow obstruction was used. The classification for each patient with these conditions was collected from the medical history, when recorded.

From the data collected, a NYHC score was recorded for 70% of GMU patients and all SMU patients with CCF. The average score for both groups was 3.

In COPD, only 47% of GMU and 63% of SMU patients had a FER recorded. The averaged FER for patients in both groups indicated that the level of airflow obstruction was severe, with the average for GMU at 45% and for SMU at 39%.

For both CCF and COPD patients, the level of severity of their chronic condition was moderate to high.

7.1.3.2.7 Allied Health Service Delivery

As might be anticipated, the delivery of Allied Health (AH) services was concentrated in the conditions of CCF and COPD. As with the census, the data collection only related to 5 of the allied health services – Physiotherapy (PT), Occupational Therapy (OT), Social Work (SW), Nutrition (NUT) and Speech Pathology (SP). Whilst there are other allied health departments providing services within acute hospitals, the volume of service delivery to these particular conditions is exceedingly small and for that reason were not included.

A high percentage of patients with COPD were seen by AH staff whether admitted under GMU or SMU. These health professionals saw a similarly high proportion of GMU CCF patients. However only 50% of CCF patients admitted under SMU receive AH services and a low percentage of all UA patients were provided with AH services.

Table 89: Number and proportion of cohort study patients treated by Allied Health staff

	CCF		COPD		UA	
	GM	SM	GM	SM	GM	SM
Number of patients treated by any AH staff	21	6	16	17	1	8
% of total patients in subgroup	91	46	94	90	10	30

Of the 69 patients attended by Allied Health professionals, no patient was seen by all 5 departments, however

- 38 (55%) were seen by 1 discipline;
- 20 (29%) were seen by 2 disciplines;
- 8 (11.6%) were seen by 3 disciplines and
- 3 (4.4%) were seen by 4 disciplines.

As a result patients may receive visits from several AH disciplines on any day and occurred in 19% of patients. Multiple visits were most common for the COPD patient group 36% of patients receiving multiple AH services on at least one occasion.

The amount of AH professional services provided to patients is predicated on their level of illness and appropriateness for intervention. From the raw data, variability in the amount of services provided by AH was seen between the three conditions. However, while the average number of days of direct patient contact provided per patient did not reflect this variability, the range provided an indication of it.

Table 90: Days of service provision by Allied Health services

	CCF		COPD		UA	
	GM	SM	GM	SM	GM	SM
mean	3.7	2.5	3.7	3	2	2.5
median	2	1	3	2	2	2.5
SD	3.6	2.8	2.2	2.7		1.7
range	1-16	1-8	1-7	1-10		1-6

The largest AH departments in the 5 hospitals are Physiotherapy and Social Work. This was reflected in the number of patients seen by each service. Physiotherapy provided services to 81% of the COPD patients and to 53% of the CCF patients.

Table 91: Number of cohort study patients treated by the individual Allied Health Services

	Patient nos.	PT	OT	SW	NUT	SP
CCF (n, % of total)	36	19, 53%	8, 22%	10, 28%	6, 17%	1, 3%
COPD (n, % of total)	36	29, 81%	7, 19%	11, 31%	5, 14%	4, 11%
UA (n, % of total)	37	4, 11%	1, 3%	2, 5%	5, 14%	0

The service delivery time varied by department. In general, Physiotherapy services were completed within 30 minutes per patient, whereas the other services usually had longer times especially in COPD patients.

Table 92: Average daily treatment time provided per treated patient for cohort study patients

	PT		OT		SW		NUT		SP	
	GM	SM	GM	SM	GM	SM	GM	SM	GM	SM
CCF	28.5	23.3	38.1	30.0	48.7	n/a	40.9	25.0	55.0	n/a
COPD	28.8	31.1	63.8	50.8	56.5	47.4	42.7	37.5	41.0	47.0
UA	n/a	26.4	n/a	26.3	30.0	120.0	49.2	55.0	n/a	n/a

n/a = not applicable

7.1.4 Processes Associated with the Delivery of Clinical Care

7.1.4.1 Use of Clinical Practice Guidelines and Care Paths

Clinical practice guidelines (CPG's) and care paths are commonly used clinical patient management tools to assist with patient care. Clinical practice guidelines may be defined as systematically developed statements which provide evidence-based information to help practitioner and patient decisions about appropriate health care for specific clinical conditions[47]. Care paths may be defined as providing a written sequence of events (frequently using a GANTT chart approach) with a time-task matrix for the management of patients during their hospital stay. It will incorporate all potential health care interventions for a specified condition and frequently forms the documentation of care for the individual patient[48-49]. The use of either or both of these tools was recorded.

In both UA and COPD, the use of CPGs was moderately common in both GMU and SMU. The use of care paths in the patient groups was much less common, although there was more use made of them in SMU areas.

Table 93: Proportion of cohort study patients with Clinical Practice Guidelines or Care Paths

	GM			SM		
	CCF	COPD	UA	CCF	COPD	UA
% of patients with CPG	39	47	40	23	53	48
% of patients with Care Path	4	13	0	8	13	26
% of patients with both	4	13	0	0	11	17

7.1.4.2 Use of a Written Plan of Care including Discharge Plans

The use of written care plans including discharge plans was recorded. The proportion of patients who had such a plan in place by 48 hours after admission showed great variation with the UA patients having these plans in place more frequently.

Table 94: Proportion of cohort study patients with a written care plan

	GM			SM		
	CCF	COPD	UA	CCF	COPD	UA
% of patients with written care plan	59	56	71	42	47	62

7.1.4.3 Principal Daily Activity for Patients

Data were collected on what was considered to be the patient's principal activity on a daily basis. Five categories were used to classify the potential activities. As anticipated, the greatest amount of time was spent in treatment but there was still a significant amount of time spent waiting for treatment or procedures to commence.

In the following table, the average number of days for each principal activity is presented with a range (in days) provided for both the treatment activity and the waiting activity. Patients in GMU spent more time receiving treatment but also spent more time waiting for treatment to commence. This may reflect differential performance of relatively inexperienced junior clinical staff. An additional factor is the complexity of conditions which were admitted to the care of GMU and were managed by the most junior staff.

Table 95: Average number of days cohort study patients spent in each activity category

	GM			SM		
	CCF	COPD	UA	CCF	COPD	UA
	Mean, (range in days))					
Initial Admission process	1	1	1	1	1	1
Scheduled for diagnostic tests or procedures	2.1	1.5	1.8	1.5	1.7	1.6
Treatment	5.6 (2-12)	6.4 (1-13)	2.3 (1-5)	3.6 (2-5)	4.4 (1-10)	2.9 (1-14)
Terminally Ill	-	5.0	1.0	-	-	-
Waiting for a treatment or procedure to commence	3.6 (1-9)	1.7 (1-3)	2.8 (1-5)	1 (0-1)	2 (0-2)	3.2 (1-13)

When exploring the data on those patients who were waiting for a treatment or procedure to commence, the largest group were patients with UA with 43% in this category at some point in their hospital stay.

Table 96: Cohort study patients who spent at least 1 day waiting for treatment or a procedure to commence

	GM			SM		
	CCF	COPD	UA	CCF	COPD	UA
Patients waiting for activity to commence (n, % of subgroup)	7 (30%)	3 (18%)	4 (40%)	1 (8%)	1 (5%)	12 (44%)

7.1.5 Discharge Practices

7.1.5.1 Was the patient medically ready for discharge?

To identify any blockages in the system of care associated with patient flows, data were collected on whether the patients were medically ready for discharge and, if they were ready, was discharge planned for that day. In the following table, the data presented are the proportion of patients who went home on the day that they were first identified as being medically ready for discharge.

If a benchmark of 90% of patients being discharged on the day they were medically ready was used, then both CCF and COPD would be below the benchmark. Patients with CCF in GMUs were much less likely to be sent home on the day that they are medically ready for discharge.

Table 97: Proportion of cohort study patients discharged on the day they were medically fit for discharge

	GM			SM		
	CCF	COPD	UA	CCF	COPD	UA
% of patients medically ready for discharge and were discharged on that day	65	82	90	77	79	93

7.1.5.2 When ready for discharge, what was the destination of the patients?

The most common discharge destination was home, followed by hostel. Two patients, who were admitted from their own home, were discharged to hostel accommodation. A higher proportion of the COPD patients from both GMU and SMU were discharged to hostel accommodation, as were GMU patients with CCF. This matched the data previously presented on where patients were admitted from.

Table 98: Location to which cohort study patients were discharged

	GM			SM		
	CCF	COPD	UA	CCF	COPD	UA
Home	80%	67%	90%	100%	89%	88%
Hostel	20%	13%	*n/a*	*n/a*	11%	*n/a*
Died	*n/a*	13%	10%	*n/a*	*n/a*	*n/a*
Other Hospital	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	4%
Missing data	*n/a*	7%	*n/a*	*n/a*	*n/a*	8%

n/a= not applicable

7.1.5.3 Major Reasons why patients remain in hospital when medically ready for discharge

When patients were not discharged, although considered to be medically ready, the medical staff were asked to identify the reasons why. The reasons for waiting could be divided into two groups, external to the hospital (eg aged residential accommodation) and internal to the hospital (eg. waiting for results to be available).

In the following table, the number of patients ready for discharge, but waiting for an activity to be completed is presented. Also listed in the table are the activities for which patients were waiting and the number of patients waiting for the specified activity.

The internal processes of acute medical and other consultations and diagnostic tests represented the highest proportion of activities delaying patients' discharge from hospital. Acute medical consultation included surgical and other medical sub-specialty consultation, residential placement included both those waiting for a residential placement to be found and those waiting for a placement bed to become available. Although consultations may have commenced earlier, they had not been completed by the time the patient was medically ready for discharge. In order that quality care was provided, patients were not usually discharged before completion of these activities. However, it represents an opportunity for redesign of internal processes, which may lead to a more appropriate LOS in hospital, especially when considered in conjunction with the information provided in Table 100.

Table 99: Number of patients and reasons why cohort study patients were waiting in hospital

	GM			SM		
	CCF	COPD	UA	CCF	COPD	UA
Number of patients waiting for an activity to be completed prior to discharge	9	5	1	3	4	3
Activities for which patients are waiting						
Consultations						
Allied Health	3	1			2	
Acute Medical	1	1		1		2
Rehabilitation consult		1				1
Return of results/test to be performed	1			2		
Residential placement	1	2				
Home supports to be arranged			1		2	
Return of Carer	2					
Patient not willing to be discharged	1					

The number of days that each patient spent waiting for activities to be completed or for services to be organised was collected. The largest amount of time was spent in waiting for allied health and medical staff to complete a consultation. In the next table, the number of patients involved and the number of days which patients spent waiting for completion of each of the activities is presented. This is for all patients including those who were not discharged home by the end of the data collection period.

Table 100: Total days cohort study patients waited for activities to be completed

	GMUs			SMUs		
	CCF	COPD	UA	CCF	COPD	UA
Number of patients	9	5	1	3	4	3
Consultations						
Allied Health	8	1			2	
Acute Medical	1	1		1		2
Rehabilitation consult		1				2
Return of results/test to be performed	1			2		
Residential placement	3	2				
Home supports to be arranged			1		2	
Return of Carer	2					
Patient not willing to be discharged	2					

7.1.6 Workforce and Workload

Data were collected daily on the workload and level of seniority of the workforce associated with the patients enrolled in the cohort study. This information was collected for medical, nursing and allied health staff. Information was collected from medical and nursing staff through completion of daily survey questions whereas allied health data were collected from computerised statistical systems.

7.1.6.1 Medical Staff Levels

The daily data collected related only to the medical units which were providing care for patients in the study. These units included General Medicine (all hospitals), Cardiology (all hospitals), Respiratory or Thoracic Medicine (4 of 5 hospitals) and Renal (1 hospital).

All SMUs (except Respiratory Medicine at MMC and SVH) had full time senior medical staff employed within the Units. These staff fulfilled a mix of roles, including in-patient services, diagnostic procedural services and ambulatory services. No GMUs had senior medical staff employed full time within general medicine. Two hospitals (SVH and The Alfred) had fulltime academic staff with sessional appointments to GMU.

Only at one hospital, (SVH) was a senior registrar employed full-time in GMU. This position was not involved in hospital rotations and provided consistency and support across the units as the other staff rotated regularly throughout the year.

7.1.6.1.1 Workload Levels

Overall, the level of seniority amongst the junior medical staff was higher in SMUs than in GMUs. Most SMUs did not involve interns in their positions but all GMUs did. The average daily junior doctor to patient ratio was slightly higher in GMUs. There was great variability in the proportion of days where the junior doctors stated that they had had contact with senior staff in relation to the cohort patients' care in both GMU and SMU. The days of contact with senior medical staff were generally much lower in GMUs than SMUs but some SMUs had very low contact times.

Table 101: Daily medical workload levels by units involved in the cohort study

a. Daily workload for General Medicine Units

	Alfred	ARMC	MMC	RMH	SVH
No. of GM units	2	4	2	4	2
No of days over which data were collected	18	21	27	27	15
Daily average number of patients per unit	19	21	18	28	26
Daily average number of junior medical staff per unit (including senior registrars)	2.5	3.0	3.0	3.125	3.5
Daily average junior medical staff/Patient ratio	1:8	1:7	1:6	1:9	1:8
Average % of days of contact with SMS	59%	52%	61%	47%	44%

b. Daily workload for Cardiology Units

	Alfred	ARMC	MMC	RMH	SVH
No of days over which data were collected	14	25	10	8	22
Daily average number of patients per unit	10	21	25	33	21
Daily average number of junior medical staff (including senior registrars)	2.1	2.8	2.7	2.5	2.5
Daily average junior medical staff/Patient ratio	1:5	1:7	1:10	1:13	1:9
Average % of days of contact with SMS	79%	80%	100%	38%	91%

c. Daily workload for Respiratory Units

	Alfred	ARMC	MMC	RMH	SVH
No of days over which data were collected	8	10	19	12	
Daily average number of patients per unit	11	18	17	7	
Daily average number of junior medical staff (including senior registrars)	2	2	3	1.1	
Daily average junior medical staff/Patient ratio	1:6	1:9	1:6	1:6	
Average % of days of contact with SMS	100%	30%	32%	17%	

7.1.6.2 Nursing Staff Levels

Recording the level of nursing staff working on the morning shift, on those days when a patient enrolled in the study was in the ward, provided an estimate of nursing hours and workload. The information collected provided a measure of the nurse:patient ratio, the level of non-regular staff rostered in the ward and the level of graduate (junior) nurses employed in each ward. In the following table, supernumerary staff (i.e. student nurses) and staff time, which was rostered to be non-clinical such as Nurse Unit Managers rostered to a management day, have been excluded.

The extent of variability across the hospitals was evident. Two hospitals (The Alfred and MMC) did not have the capacity to divide their wards in to GMU or SMU wards. However in those hospitals where it was possible to distinguish between SMU and GMU ward areas, there was always a lower patient to nurse ratio in the specialty unit wards. In GMUs, there was usually a patient to nurse ratio of near 4, whereas in SMUs the ratio was closer to 3.5.

Graduate nurse allocations to GMU wards varied markedly between hospitals. At ARMC, only 9% of nurses in the GMU ward areas were junior nurses, whereas the level at SVH was 26%. In SMUs, there was less variability with a range of 11% to 15% of nursing staff at the graduate nurse level.

The use of non-regular nursing staff (either agency or bank staff) was higher in the GMU wards, where close to 15 % of all GMU wards had non-regular staff employed. In SMUs, the level of non-regular staff ranged from a low of 7% to a high of 13%.

Table 102: Nursing workload by hospital and type of ward

	Variable	Alfred	ARMC	MMC	RMH	SVH
GM	Patients (mean)	*n/a*	20.4	*n/a*	25.8	24
	No. of nurses (mean)	*n/a*	5.2	*n/a*	6.7	5.9
	% Non regular staff	*n/a*	15%	*n/a*	14%	15%
	% Graduate Nurses	*n/a*	9%	*n/a*	20.0%	26%
	Patient:nurse	*n/a*	4	*n/a*	3.8	4
SM	Patients (mean)	*n/a*	21.7	*n/a*	17.8	21
	No. of nurses (mean)	*n/a*	6	*n/a*	5.3	6
	% Non regular staff	*n/a*	11%	*n/a*	13%	7%
	% Graduate Nurses	*n/a*	15%	*n/a*	11%	14%
	Patient:nurse	*n/a*	3.6	*n/a*	3.3	3.6
CCU	Patients (mean)	10	5.6	18	9.1	18
	No. of nurses (mean)	4.9	4.8	7	4.8	6.8
	% Non regular staff	2%	5%	0	5%	9%
	% Graduate Nurses	0	4%	4%	3%	6%
	Patient:nurse	2	1.2	2.5	1.9	2.7
Both GM and SM	Patients (mean)	29.5	21	21.8	20.7	22.7
	No. of nurses (mean)	8.9	5.6	5.5	5.8	6
	% Non regular staff	11%	14%	6.4%	13%	12%
	% Graduate Nurses	15%	13%	13%	14%	21%
	Patient:nurse	3.3	3.8	4	3.5	3.8

n/a = not available

7.1.6.3 Allied Health Staffing

In the last 5 years, the AH professions have developed and tested national indicators for workload data collection using electronic systems. This includes measures of direct individual patient attributable time, other clinical time such as multidisciplinary discharge planning meetings where the time may not be attributable to an individual patient or group therapy sessions, research and student teaching time and clinical services management times.

These elements were collected to a variable extent by the departments involved in this study. Unfortunately the only data, which was reliably collected across all five sites, was that relating to the individual patient attributable time category (IPA time) and these are the only data which have been analysed for presentation. The time for each patient enrolled in the study was collected, as was the total IPA time for that day for all other patients provided with AH services.

All AH professions have students placed in their departments for clinical experience. It is a common practice for students to provide a therapy or other appropriate management for patients, whilst being supervised by a senior staff member. On these occasions, the time recorded in the statistical system indicates an indication that the service was provided by a student.

Individual department data are presented in the following sections.

7.1.6.3.1 Physiotherapy

Of the 109 patients, physiotherapists including physiotherapy students treated 51 (47%) of patients and provided 161 sessions of IPA time. Junior staff or students on clinical placement provided the majority of treatments (71%). When service delivery was divided into GMU or SMU across all hospitals, 58% of GMU patients received physiotherapy whereas only 37% of SMU patients did. Across all hospitals, the IPA time for these patients represented 9% of the total IPA workload of these physiotherapists. At 4 of the 5 sites, junior staff provided services for patients in GMUs and at the other site a senior staff member provided all GMU patient services. Senior staff at MMC treated all SMU patients, whereas at the other 4 hospitals, an even mix of senior and junior staff provided physiotherapy for SMU patients.

7.1.6.3.2 Social Work

The staff from the Social Work departments saw 23 patients (21%). When considered by GMU or SMU, social workers saw 30% of GMU patients and 14% of SMU patients. Overall these patients had 50 social work sessions. Across all hospitals, the IPA time for these patients was 14% of the total IPA workload of the specific social workers involved. At 4 sites, junior staff or students provided services for GMU patients and senior staff only provided services for SMU patients.

7.1.6.3.3 Occupational Therapy

The staff from the Occupational Therapy departments saw 16 patients (15%). The majority of patients seen were from GMU (24% of all GMU) with only 7% of all SMU patients seen. In total, 42 sessions were provided for the 16 patients. Across all hospitals, the IPA time for these patients was 12% of the total IPA workload of the specific Occupational Therapists involved. The junior staff provided the majority of the 42 sessions (79%). There was limited senior staff involvement in the GMU patient group.

7.1.6.3.4 Nutrition

The staff from the Nutrition departments saw 16 patients (15%), with 20% of GMU patients and 10% of SMU patients seen. These patients were seen on 28 occasions. Across all hospitals, the IPA time for these patients represented 15% of the total IPA workload for the specific dieticians involved. A mix of senior and junior staff provided the services for both GMU and SMU.

7.1.6.3.5 Speech Pathology

There was limited involvement in these patient groups by the Speech Pathologists. Two sites did not have any involvement. At the remainder, 5 patients were seen with 4 in GMU and 1 in SMU and 15 treatment sessions were provided. Across all hospitals, the IPA time for these patients was 18% of the total IPA workload of the specific Speech Pathologists involved. Junior staff treated patients in GMU and senior staff, the SMU patient.

7.2 Summary

The recruitment rate for this phase of study was slower than anticipated and at some hospitals in some of the specified DRGs, very low rates were obtained for either GMU or SMU. The sample was biased towards patients who were oriented and spoke English, as they had to be able to understand the Plain Language Statement and subsequently sign the consent form. In addition, some of the measurement tools could only be administered in English, for instance the MMSE.

In general, the patients recruited to this phase of the project had similar demographic characteristics to the census patients reported in Chapter 6. The patients in GMU were older, had more social issues, used more medication and were less oriented. In addition, screening tests for psychiatric co-morbidity indicated the potential for patients in both GMU and SMU to be depressed or anxious, with an indication that the levels could be higher in GMU patients. The use of clinical decision support tools was disappointingly low, with some use made of CPGs but less use made of care pathways, although this was very variable between and within hospitals.

For those patients who were medically ready to be discharged but still waiting in hospital, there seemed to be an opportunity for all of the hospitals to review their internal processes. The largest amount of time spent waiting was for completion of internal processes.

As a result of the staff allocation practices, the management of GMU patients was undertaken by less experienced doctors with lower levels of consultant medical staff availability for supervision than that seen in the SMUs. In nursing and allied health, more junior staff were allocated to work with GMU, but there is more senior staff regularly available in the working area. In general, the majority of patients with CCF or COPD were seen by AH whereas only a quarter of UA patients were seen by these professions. There was more allocation of AH staff time to the GMU patients than SMU in contrast to that seen in the census data. However as few patients with UA were seen by AH, this finding may be related to a condition bias in the dataset. For nursing, there was a high usage of non-permanent staff in GMU at some hospitals, whereas most SMU areas had more permanent staffing available.

8. Discussion

This project has examined features of management of medical patients who were admitted to the five large teaching hospitals in Melbourne: the Alfred Hospital, Austin and Repatriation Medical Centre, Monash Medical Centre, Royal Melbourne Hospital and St Vincent's Hospital. In particular, the study had an emphasis on examining performance by the hospitals in relation to the management of patients admitted under the care of GMUs.

8.1 Key Findings

All hospitals have implemented decentralised organisational structures whereby core activities are divided into sections frequently called directorates. Each clinical section in the five hospitals has senior clinical staff, both medical and nursing, involved at the top management level. The necessary reporting and communication relationships, which in particular enabled reporting on clinical outcomes, were in place to varying degrees. It was apparent that few hospitals had structures and supporting systems which ensured the clinical and organisational goals were aligned.

Our observations from across the five hospitals indicated that in GMUs,

- the resident medical officers were more junior and junior medical staff turnover was much greater than in SMUs;
- senior medical staffing was more fragmented, with no fulltime appointments in any of the hospitals for GMUs in contrast to SMUs;
- nursing staff in general medical wards had more graduate level nurses and made greater use of non-permanent staff than in corresponding speciality wards;
- allied health staff were generally junior and may turnover at 3 monthly intervals;
- service and quality improvement activities for medical in-patient management was variable, uncoordinated and frequently not aligned to organisational goals;
- professional development of senior medical staff was usually left to individual responsibility and was unrelated to strategic goals of the organisation and
- no formal management skills training was provided for clinical leaders from any of the health professions.

The occupancy rate (>99%) in the five hospitals was extremely high. Over 95% of all GMU in-patients were emergency admissions. There was some variability in the extent of emergency admission between SMUs from both the VAED and census findings. At each hospital, there were different admission policies in the ED but this seemed to have minimal impact on admission practices and on the characteristics of patients admitted to GMUs at the different hospitals. From the census data, most GMU patients were admitted directly from home (77%) with a reasonably high proportion (13%) from hostels and relatively few patients (4%) from nursing homes.

Catchment areas for each hospital were defined on the basis of SLAs providing greater than 5% of total separations for each hospital. The level of relative socio-economic disadvantage and availability of community support factors within catchment areas differed between the five hospitals. These factors are usually considered to have the potential to impact adversely on the ability to transfer or discharge patients to a community setting in a timely way. Both RMH and SVH had catchment areas with lower socio-economic status and higher proportions of residents born overseas. The availability of aged residential care (both high and low) was also lowest for RMH. A further support measure, the informal carer index (ratio of people aged 45 –60 years to people aged 80 years or more), which provides an indication of potential support availability for convalescence and continuing care at home, was developed for each hospital's catchment area. This was generally low for most hospitals and predicted to decline over the next 15 years.

The current availability of aged residential places would appear to be grossly inadequate. From the management interviews at the hospitals, it was evident that in the last 12 months there has been a weekly average of 23 patients (ranging from 13 – 32) remaining in each hospital awaiting aged residential placement. This represented approximately 36,500 bed-days in a full year across the five hospitals.

From the examination of the 1999/2000 VAED, our study showed that medical in-patients generally accounted for between 40% and 50% of multi-day stay in-patient episodes at these hospitals. General medical units managed 27% of medical patients, although there was great disparity between hospitals. For three hospitals, ARMC, RMH and SVH, the proportion of multi-day medical in-patient separations cared for

by general medicine was remarkably similar at 32%, 34% and 35% respectively, whereas at MMC and The Alfred the proportion was much lower at 16% and 14% respectively.

General medical unit patients typically were older with more co-morbid diseases, and frequently had cognitive and other social factors, which were likely to affect discharge planning and particularly the likely destination at discharge and expected LOS.

The average LOS is commonly used in Victoria as a broad gauge of hospital performance. From both the VAED and census analyses, it was apparent that this may be misleading as both datasets demonstrated a skewed distribution of LOS, with a small proportion of patients with long lengths of hospital stay. This is best illustrated in the VAED by reviewing the use of bed-days for medial in-patients who were in hospital for more than 13 days in 1999/2000. Whilst this long-stay subgroup represented less than 13% of total separations for multi-day stay medical in-patients in 1999/2000, the care provided for this group of patients consumed over 48% of bed-days occupied by multi-day stay medical in-patients, with an overall average LOS of 27.4 days.

As there is no better indicator readily available however, the data were analysed using average LOS. When all separations, irrespective of hospital or condition, were analysed for average LOS by unit, GMU separations had a longer average LOS (8.5 days ± 10.3) than SMU separations (6.7 days ± 9.9). Further analyses of the data were undertaken on the nine most common DRGs for the GMUs. These DRGs accounted for at least 40% of the GMU workload in each of the 5 hospitals. For these DRGs, outcomes were compared with those from corresponding SMUs at each hospital and between GMUs for each hospital.

There were minimal differences in LOS between GMU and SMU for respiratory infections, COPD, CCF, dementia and stroke. The only observed significant difference was in the management of unstable angina where SMU patients left hospital in a shorter timeframe. Other co-variates such as age, gender, co-morbidities and discharge destination, which are considered to have the potential for increasing LOS, were then included in LOS analyses. When the outcome was adjusted for these factors, the GMUs at The Alfred and ARMC discharged patients slightly earlier than the corresponding SMUs. For MMC, the rate was almost the same for both subgroups and at RMH and SVH the difference between the average expected LOS narrowed between SMU and GMU, but SMUs still discharged patients in a slightly shorter time.

When the highest volume DRGs for GMUs were compared, important differences emerged. Firstly there was a large degree of variability between hospitals on average LOS. However the use of average LOS as a performance indicator may be misleading. From this data set, it was apparent that there was a very wide distribution for LOS. There were a small but influential number of separations that had a very long LOS. These separations utilised a disproportionately large percentage of the available bed-days. Statistical analysis of high outlier patients remaining in hospital for greater than the hospital average LOS plus two standard deviations demonstrated that 7% of patients of The Alfred are in this group, whereas the other hospitals have 5% or less. The second key point of difference was in the area of discharge. The type of location to which patients were discharged varied greatly between hospitals. Whilst home was the most common destination, the next most common destination was a category entitled “other hospital” and then “nursing home” which covers both nursing home and hostel placement. In comparing activity by the common high volume DRGs across the GMUs, no hospital consistently outperformed the others. Better performance on average LOS was seen in the management of respiratory conditions at The Alfred, in unstable angina at MMC and in stroke at SVH.

The discharge destination has a very significant influence on LOS. The proportion of patients discharged to home was approximately 83% for all multi-day medical patients with lower proportions of GMU patients (74%) being discharged to home. The average LOS for this group was 6.1 days. There was variability between hospitals in both proportions of patients discharged home and the average LOS for these patients.

The proportion of patients accounted for in the “other hospital” destination was 7.4% with an average LOS of 12.3 days. The extent to which patients were discharged to “other hospital” varied greatly between hospitals with The Alfred generally sending the highest proportions of patients from its high volume DRGs to this destination. The LOS for this destination showed high variability between hospitals for both GMU and SMU.

The proportion of patients discharged to a nursing home placement was much higher from the GMUs than SMUs but overall represented only a small percentage (1.7%) of separations, with an average LOS of 15.5

days. There was variability in LOS evident between hospitals. It was interesting to note that the proportion of patients being discharged to a nursing home was lowest at RMH, which may be a reflection of the lower availability of beds in the surrounding catchment area.

A separate analysis of the impact of discharge destination upon LOS was undertaken for the long stay subset of patients (LOS $\geq$ 14 days). Overall this long stay group accounted for 12.6% of multi-day stay medical in-patients, with an average LOS of 27.4 days, representing 48.3% of total bed days. The proportion of long stay patients in GMU was higher but the average LOS in SMU was greater. Variability in both the proportion of separations and average LOS was evident between hospitals for both SMU and GMU.

The proportion of long stay patients discharged home was 59%. A higher proportion of SMU long stay patients went home. ARMC had the lowest average LOS for long stay patients discharged home. For the 18% of long stay patients discharged to other hospitals, there was a high degree of variability in both the proportions discharged and the average LOS between hospitals and between GMU and SU. The average of LOS was 28.3 days. Overall, 5.1% of long stay patients were discharged to a nursing home, with an average LOS of 30.9 days. The proportion of GMU long stay patients (8.6%) discharged to nursing homes was greater than for SMU patients (3.3%). There was a high degree of between hospital variability in both proportion of separations (GMU 5% -12%) and average LOS (GMU; 21.5 days - 38.5 days) for this discharge destination.

It was evident that the efficient discharge management of the medical in-patients related to the availability of community-based support, either at home or in subacute care or aged residential care. The reasons why 60% of multi-day stay medical in-patients with a LOS greater than 13 days remained in hospital before going home were not clear and warrant further investigation. It would be unusual for this prolonged LOS to be based purely upon need for acute clinical care, particularly in view of findings from the census study, which demonstrated the likely impact of social factors and cognitive state upon LOS.

The data that were obtained from the both the census study and the cohort study of individual patient clinical management confirmed the findings from the VAED analysis. There were some differences as the cross-sectional census data were likely to have an over representation of long stay patients when compared to the data from the VAED. Nonetheless the same patient characteristics were evident – patients in GMUs were older, had more co-morbid diseases and a longer duration of stay. Other factors, which can not be elicited from the VAED, included a significantly greater level of social and cognitive problems, a requirement for higher levels of assistance with personal hygiene and nursing care and more utilisation of allied health time.

An interesting feature identified from the census was the higher volume of patients who were admitted from low level (hostel) aged residential care compared to those from high level or nursing home care. This may be a reflection of the nature of hostels where the expectation is that residents are essentially able to look after themselves under minimal supervision of staff with little experience of acute medical care.

The proportion of medical in-patients in the census, who had been admitted in the last month, or had more than 3 admissions in the last 12 months, were high at 20% for each re-admission category. The characteristics of this group warrant closer examination to determine whether there are opportunities to minimise the requirement for recurrent admission, either by better discharge planning or examination of opportunities for care coordination leading to improved community-based management.

Social factors were identified by medical and nursing staff as likely to affect LOS for a high proportion of patients, more so for GMUs rather than SMUs. The specific factors identified included patients who lived alone; had a higher level of dependency for care; required additional home and carer supports and for those patients unable to return home, transfer to aged residential placements.

Patients in SMUs had better functional status and required less nursing care and assistance with personal hygiene than patients in GMUs. A high proportion (35%) of patients in the in-depth cohort study was considered to be at risk of psychiatric co-morbidity, with a larger proportion of GMU patients likely to be at risk of depression. Recognition of the potential for psychiatric co-morbidity needs to be emphasised to treating medical staff, as they did not identify these levels of depression and/or anxiety as active co-morbidities in either the census or cohort study patients. Cognitive function was worse in GMU patients. This would be an anticipated outcome for a group of patients who are older, more frail and less oriented. In both the census and cohort studies, the reasons why patients remained in hospital were identified. In particular, data were collected on whether patients were medically ready for discharge on that day. For the

patients who were not medically ready for discharge, SMU patients were no less likely to be waiting for tests than GMU patients were. However the disoriented patient was more likely to have social factors affecting LOS, suggesting that the needs of this group in particular present a challenge in relation to discharge planning.

The census study data demonstrated that SMU patients were 3.5 times as likely to be discharged on the day they were medically fit for discharge, compared with patients in GMUs. Where patients were identified in the census study as medically fit to be discharged but a decision was made not to discharge the patient on that day, further questions were asked to elicit the reasons behind this decision. The major reason for patients remaining in hospital related to an access blockage to aged residential care. The other reasons could be grouped under the heading of failure of internal processes. Most of these related to delays in completion of medical, subacute and aged care or allied health consultations or, for a very few patients, awaiting the outcome from specific tests. The issue of managing the delays in availability of tests, results and additional consultations appeared to be a relatively minor, albeit important issue.

Using the census study data, a multiple logistic regression analysis of factors responsible for a patient being present in hospital beyond the 13th day of their in-patient episode of care suggested that this was most likely to be accounted for by social factors, impaired cognition and patient nursing care needs. After adjustment for these factors, age was less likely to be associated with a stay in hospital beyond the 13th day.

Patients in GMU made more use of allied health (AH) services in both the census and cohort studies. Lower usage of AH was seen at The Alfred in GMU but in the other hospitals approximately two-thirds of the overall GMU patients were seen by AH staff. Staff from AH saw about half of the SMU patients. Physiotherapy provided the largest volume of services to both GMU and SMU. Some of the internal process time delays for patients related to completion of AH consultations and this should be an area which all AH services review. In addition, the variability in service provision across the GMUs may warrant investigation at specific sites. For instance, the lower level of social work service delivery for GMU patients at RMH may be a key factor in the longer LOS seen in this patient group at this hospital.

Thus availability of appropriate high and low level aged residential care was a key issue for consideration when examining opportunities for improved efficiency in managing the in-patient episode for this group of patients. For those people who were waiting to go home, the key issues included availability of additional home and carer supports.

The consumer perspective was obtained by using a representative sample of GMU patients in focus group settings from 2 of the 5 hospitals. The focus groups set out to identify the primary broad issues of importance in hospital care as perceived by these recent medical in-patients. Both hospitals received high praise from participants and participants were particularly generous in their comments toward staff abilities and friendliness.

The primary outcome from the focus groups was recognition that the most important aspects of hospital care change as patients' situations change. At the time of admission, being settled in a ward quickly was perceived as essential. Patients did not feel they have really been treated, or that they can commence recovery, until they were settled in the ward. Relationships with staff during the hospital stay were critical in determining patient perception of care. Confidence in staff abilities, as well as being treated with courtesy and respect, were tightly linked to helping patients feel integrated with their care program and able to ask questions of staff caring for them. As patients began to improve, planning for discharge became the most important issue. Participants were curious about preventing a recurrence of the illness, as well as preoccupied with ensuring they made appointments with specialists, where appropriate, after discharge. Most participants felt they did not have enough information about after-hospital care.

8.2 Limitations of the studies

The qualitative interviews with the senior hospital staff were limited to two or three people at each organisation. A wider cross-section of senior staff, which incorporated all of the health disciplines, may have provided a more comprehensive picture. The consumer perspective was similarly very limited and a wider generalisation from the findings was not possible.

The use of VAED enabled the development of a system-wide view of hospital performance in relation to medical in-patients. However VAED information is a secondary data source, as it was not originally

collected for the purposes of this project. Therefore, it is not possible to gain answers to all questions raised, only to discover "signposts" to areas which require further investigation, eg with the long stay patients it was possible to describe the LOS and where patients were ultimately discharged to but it was not possible to ascertain whether remaining in hospital was appropriate or not.

Although within the VAED, there are standardised definitions for the mandatory elements, it was evident that there were some inconsistencies in data entry. As the VAED information came directly from hospital extracts, there was more potential for inadvertent omission of data. However, the state-wide repository for VAED, which may have been more reliable, does not include an element which describes the type of clinical service responsible for the management of each episode of care and therefore could not be used in this study.

The census study provided a good overview of the system of care for multi-day medical in-patients. However, as it provides a cross-sectional view, it is likely to have an over-representation of patients who had been in hospital for prolonged periods. This methodology was labour intensive in the short term but was very effective in capturing all relevant patients.

Unfortunately the cohort study did not meet expectations in terms of recruitment rates. It also had an inbuilt sampling bias in the subject recruitment. Patients were required give informed consent and undertake some tests in English, which limited the types of patients who could be recruited. However, it was anticipated that it would still be possible to gain a picture of the day-to-day processes involved with the system of care. As we were only able to recruit just over 50% of all potential subjects, it is possible that the cohort of patients who were recruited were in some way different, from those patients who were not recruited.

Lastly the medical and nursing workload data were largely derived from personal interview of medical and nursing staff. There was insufficient time allowed within the project to examine workload in a more in-depth way. Although the allied health departments all collect performance data it appeared to only be standardised for one aspect of their data collection, namely the individual patient attributable time. It was not possible to interpret data on any other relevant activities undertaken within these departments.

8.3 Comparison with other work

The management of acute hospitals and more specifically their ability to maintain bed access for patients presenting with an acute medical illness has become a major challenge, not only in Melbourne but also in many other countries[8]. In Victoria in recent years, the major focus for improving the ability of hospitals to increase their patient throughput has focussed on the management of ED waiting times and surgical patients with performance incentives built into the annual funding models[50]. Areas of practice such as pre-admission assessment, day of surgery admission, structure and management of elective surgery waiting lists have been under close examination[51-58]. However the specific issues with management of patients presenting with medical illness has not been as well examined in the literature. To date most literature published in this area has looked at overall acute medical admissions[8], problems associated with long hospital stay[59], the role of general medicine in the management of acute medical admissions and particularly in the management of the elderly medical patient[9, 60]. Publications, which have reviewed performance outcomes for medical patients, have tended to review the impact of a change in bed management and specialisation for single system diseases or changes in practice in ambulatory care[61-65].

Our findings on multi-day stay medical in-patient care are consistent with the findings from other countries, specifically that for most patients, care is provided within a short time frame (average 8 days) and the great majority of patients are discharged home[66]. However a small proportion of patients remain in hospital and utilise a large percentage of available resources. The characteristics of these long stay patients and retrospective review of the appropriateness of acute hospital care of these patients have received little attention in the literature[66]. The constant availability of community based support including both subacute and aged residential care is crucial to overall hospital bed management[13]. As evidence from our study, the under recognition by clinical staff of psychiatric co-morbidity may also be a contributing factor to the longer stay in hospital for many patients and the rehospitalisation rates of patients[67-69]. Our study has also demonstrated the potential impact on LOS of impaired cognition and some social factors.

The development of clinical leadership as espoused by Degeling et al (1998) did not appear to be a feature of management at three of the five hospitals[18]. SVH and to a lesser extent ARMC seem to have developed structures and systems which support clinical leaders down to the individual unit or department level. None of the hospitals had any development programs in place to promote the role of clinical leadership for any of

the senior staff, irrespective of discipline. However senior executive staff at ARMC have commenced planning such a program for their senior medical staff.

From our study, the expressed concerns of the consumers echo those from previously published work from the United Kingdom[60]. Common issues relate to ensuring adequate arrangements at discharge and in correcting deficiencies in the physical environment of ward areas.

8.4 Implications and Future Directions

This study arose from the observation that bed-day usage for multi-day stay medical in-patients was increasing at a time of increasing demand for access to acute hospital beds in Melbourne, a phenomenon that has been observed internationally. The further observation that the LOS for patients with similar discharge diagnoses, as described by DRGs, managed by GMUs was longer than for patients managed by SMUs within the same hospital prompted the desire to better understand the factors which might contribute to this state of affairs.

The problems confronting hospitals in delivering acute services are complex. Responses require analyses. Simple solutions are not immediately apparent; intelligent solutions require changes to service delivery systems, inter-agency collaboration and the use of evidence to inform best practice. Cultural change and improved clinical leadership are vital to successful change, along with ongoing education of clinicians of all types. Risk management will ensure the chances of improving patient outcomes and resource usage are optimised when changes are introduced.

The next steps will be to examine how performance might be improved in the management of the acute episode of care for such patients so as to better utilise the resources available, for the benefit of those receiving care and those seeking access to care in the acute hospital setting. How should the findings from this series of studies be used to best inform efforts to reform the process of care so as to improve outcomes for patients, reduce inappropriate variation in clinical practice and to improve access to services?

Aligning clinical and organisation goals as demonstrated by RNSH[17] led to better use of resources by clinicians without compromising the quality of care delivered. In order for this to be successfully achieved in the five hospitals studied, it will be important for both clinicians and administrators to invest time in developing clinical leadership skills as a first step towards aligning clinical goals and responsibilities with organisational goals.

Increased support at the hospital level with appropriate data collection systems and analyses will be essential in supporting clinical leaders. Both unit-specific and hospital-level comparative data will be needed if further gains in health care reform are to be made in the area of clinical care. Such system-based performance improvements should aim to shorten LOS for both the short LOS patient group and for the smaller group who have a LOS greater than 13 days. This is based on the evidence that a proportion of the episode of care in these studies included days of stay beyond the point where discharge was appropriate on medical criteria. This will require transparent clinical accountability for systems and processes of care as well as patient outcomes. Peer-to-peer accountability may well prove to be an important driver for change in this area. Performance indicators need to be developed which specifically relate to the management of discharge of patients, as a mechanism to assist with engaging clinicians in the ownership of the discharge planning process.

Increasing the collaboration between hospitals, especially on activity performance in the management of medical multi-day stay patients should lead to a better overall use of resources throughout the system. A roundtable forum, sponsored by the Department of Human Services, which initially has representation from the 5 hospitals in this study, could be an appropriate method for facilitating collaboration. The forum should aim to include all metropolitan hospitals in the longer term. It may be also possible to involve rural hospitals through teleconferencing links at the larger rural centres. This forum would need to have specific terms of reference developed and be built around examining issues across the health care system to ensure that small variations in practice with small patient numbers are not being considered in detail, to the exclusion of system-wide issues.

Further consideration needs to be given by hospitals to the level of senior medical staffing provided in general medical units. The use of only sessional medical staff may not be the most appropriate way of providing adequate clinical expertise and supervision to the junior staff who are rostered to care for patients

in GMUs. In this study, two different models for providing more constant senior staff have been briefly outlined. In one model, (RNSH), an additional FTE has been added to the staffing levels to assist with ensuring clinical goals are meeting organisational needs particularly in the area of medical responsibility for discharge planning as part of the access and demand management strategy. In the other model at SVH a senior non-rotational registrar position has been implemented to provide on campus assistance to any GMU junior medical staff.

As the patient population being managed in GMUs is older, with the average age over 70 years, hospitals need to reconsider the clinical skill mix required to manage patients in GMUs. Most do not have a geriatric consultant as part of the GMU medical team. Access to their particular skills and knowledge may be helpful in ensuring appropriate clinical care is provided. All staff caring for patients in GMUs should have access to further training in aged patient care management, as it would appear from the literature to be beneficial in facilitating appropriate lengths of stay[4, 60, 70]. Management approaches for older patients with acute illness, which include programs aimed at maintaining or improving their functional status, appear to assist with timely discharge[70]. From our data, it was also apparent that there needed to be a greater recognition of, and management strategy implemented for, psychiatric co-morbidities. This has also been shown to reduce inappropriate LOS and to lessen re-admission rates[67-69].

The development of medical assessment and planning units, through which all general medical patients are channelled and management programs quickly established, appeared to be an effective way of ensuring appropriate care programs were implemented particularly as a means of facilitating risk assessment and proactive allied health treatment. Clinical assessment, which includes screening for cognitive and depression problems, should be completed within 24 hours of admission. This will enable all multidisciplinary staff to implement strategies to reduce any adverse risk for the patients and to commence discharge planning in a timely manner. Where staff activity and performance in clinical management of patients is informed by data and linked to patient outcomes, such as appropriate LOS or timely institution of home support services, delays in discharge are reduced.

General indicators may be built around discharge performance. From the 1999/2000 data, 87.4% of multi-day stay medical in-patients were discharged in 13 days or less. If a performance benchmark of 90% had been in place and the target met, a further 1198 patients would have been discharged earlier. At a minimum, this would have released over 15,500 bed-days in 1999/2000. Based on the overall 1999/2000 average LOS for these medical in-patients of 7.2 days, this would have provided one additional bed per day at each of the 5 hospitals. A modest increase in performance but nonetheless a potential opportunity for improvement and relieving some of the pressure in the health system for bed availability. How best to reach such a target might involve judicious development of key performance indicators related to discharge planning requirements for both short and long stay patients.

Casemix funding for common DRGs such as heart failure, COPD and respiratory infections need to be further investigated to include a specific complication of impaired cognitive function. Disorientation and loss of other cognitive abilities were major factors contributing to increased LOS for patients with these conditions, irrespective of whether managed under GMU or SMU. For implementation of this level in the casemix formula, a validated instrument measuring cognitive function would have to be recorded for patients where this level of classification was being sought. This should be included in the risk assessment instrument completed on admission of each medical patient. Consideration should be given to developing a method for including social factors, such as living alone, as a "complication" in the casemix formula as it impacts on LOS for medical in-patients.

At present the assessment of patients identified by the acute hospital physicians as needing access to subacute care facilities is frequently undertaken by the key providers of such care. We propose that separation of these roles be considered, so that it is transparent that the needs of the patient are paramount in the decisions being made, rather than using the assessment as a means of rationing access to aged care or subacute facilities. This may also facilitate better integration of acute care with ongoing community-based aged care.

The adequate availability of both subacute and community aged residential placement will be an ongoing issue with the potential for escalating demand over the next 10 to 20 years. The aging of the population has been documented, while there has not been a concomitant increase in aged residential facilities. One of the potential alternative avenues to increased community support and reduced need for additional facilities may be to increase the funding for at-home carers, whether relatives, neighbours or people employed as in-home carers. Projections for the reduced availability of informal carers and variable availability of such care across

SLAs suggest that this issue will require urgent attention at the policy level, if it is not to contribute to the access/demand problem in acute care.

The use of substitution services, such as Hospital at Home and Post Acute Care, warrants further investigation at the clinician level as well as at the hospital executive level. There is a need to determine why clinicians do not use these services more widely. Anecdotally, it appears that some of the services may be difficult to access or that patients are required to go onto a waiting list, which again will lead to patients remaining in acute care longer than medically necessary. This may also be the case with home and community support services (HACC) provided by the local government sector. Further investigation is warranted to establish the reality of service demand and supply, particularly the provision of services during out of usual business hours.

Further research into the reasons why medical in-patients remain in hospital beyond 14 days is warranted. Approximately 60% of these patients managed in both GMUs and SMUs ultimately go home. It is unclear why they remain on average almost twice as long as those patients who are discharged home in less than 14 days do. The potential contribution to increased LOS for such patients from impaired cognition and social factors, as identified in this study, warrants urgent attention. A 10% improvement in LOS for this group would represent 23 beds becoming available (i.e. nearly 5 additional beds available per day at each of the 5 hospitals). This represents a potential opportunity to contribute to demand management and to reduce access problems at these acute hospitals.

With the aging of the population, demand for medical care is increasing and in parallel there has been an increased ability to provide new modes of care for common chronic medical conditions, thus further fuelling demand and society expectation. Future demand management for acute health services will require either higher levels of investment in acute hospital-based services or redeployment of patients to alternative care settings, once the acute phase of the episode is finished.

Some potential for improvements in efficiency of care during the acute episode can be identified from these studies chiefly as they relate to discharge planning, particularly in relation to the issue of ensuring that patients, who are medically ready for discharge, are discharged on that same day. Performance indicators would be developed, particularly for consultative services, to focus attention on the potential for improvement in this area.

However, urgent attention is needed to develop policies to facilitate the provision of post-acute care in settings which are more appropriate to need and cost less than the continued provision of such services in the acute hospital setting, as at present. If demand for acute hospital services is to be managed effectively, the utility of such means of reducing occupancy of acute hospital beds by patients during the post acute phase of illness must be examined. The impact of social factors and cognitive function on likelihood of an extended LOS has been clearly identified in this report. These seem to be obvious areas for targeted interventions to reduce an unnecessary component of acute hospital LOS.

It is highly likely that a shortage of residential care facilities (chiefly nursing home beds) is a factor contributing to prolonged LOS for complex medical patients. The availability of informal carers and the support services needed to provide in-home care in the post acute phase as potential contributory factors needs to be examined. The potential for transitional care programs to contribute to post acute care, either in the home or in appropriate facilities, warrants further investigation as a means of managing demand for acute services.

Unfortunately the mixture of services which such a program requires, is currently provided across three levels of government in a multitude of programs. There are very few incentives for a rational and cohesive approach to targeted delivery of services to a small group of people who happen to have a major impact on demand for hospital services, because of inability to provide appropriate and effective service delivery in alternative highly appropriate settings. Reform in this area is urgently required if improvements in acute hospital efficiency are to be a cornerstone of improved access to acute hospital services.

9. Conclusion

The provision of clinical services in specialty units did not lead to a better LOS outcome for patients with complex medical conditions which included impaired cognition and other social factors. Socio-economic factors and the differential availability of sub-acute services and both formal and informal community-based residential care complicated the identification of differences in performance between hospitals.

In the management of this group of patients, there is potential for redesign of the day-to-day clinical processes of care within hospitals to contribute to improved performance (reduced LOS). Such potential for improvement needs to be identified and realised in order to improve access in the setting of constrained resources as there is relatively fixed acute hospital bed availability. A specific factor, which should be considered in process redesign, includes the level of seniority of staffing from all professions for patients in GMUs.

The potential for reform of management processes for long stay patients has led to a focus on the very important issue of access to high level aged residential care. Nonetheless, the fact that most long stay medical in-patients ultimately went home suggests that reform of the process of care for this group of patients will need to be more closely examined. Social factors, cognitive function and possibly depression are factors likely to affect LOS and should form part of this study.

At the hospital resource level occupied bed-days are the critical resource whilst for clinicians their thinking is dominated by bed availability. In terms of demand management, the issue is the timely availability of an appropriate bed in relation to predicted demand in order that both emergency and elective admissions can be accommodated without undue stress in the system of care.

It seems highly likely that if resource management (hospital bed-days) in hospitals is to become an issue of clinical importance then organisation of care delivery will need to change, particularly for the complex medical patients commonly managed in GMUs.

General Medical Units will continue to provide on-the-job training and experience for junior medical, nursing and allied health practitioners. In this context it may be important for GMUs to be staffed by a mix of fulltime and sessional senior medical staff. These staff will require management skills. Training should be provided to foster clinical leadership that is focussed on the integration of organisational goals, chiefly increasing efficiency of hospital resource utilisation, with clinical management and improved patient outcomes for the increasingly complex group of patients managed by GMUs in acute hospitals. In addition training for general medicine consultants and trainees should be better integrated with that provided for geriatric medicine.

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11. Appendices

Appendix 1 Focus Group Report

The attached report was produced by Campbell Research and Consulting – a consulting group with no personal or ongoing financial relationship to the Clinical Epidemiology and Health Service Evaluation unit of Melbourne Health.

CAMPBELL

RESEARCH & CONSULTING

Medical Inpatient Study

A.C.N. 073 813 144

A report of two focus groups held with recent medical in-patients from the Royal Melbourne Hospital and Monash Medical Centre.

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For the Medical Inpatient Study

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Overview of Findings

Focus groups were held with patients to access patient perceptions of their experience as a medical inpatient. Two groups were planned to be conducted by Campbell Research & Consulting with hospitals taking responsibility for recruitment[2].

Both the Monash Medical Centre (MMC) and the Royal Melbourne Hospital (RMH) received high praise from participants. Participants were particularly generous in their comments toward staff abilities and friendliness.
The findings in this report outline issues patients perceive to be most important to their care. The report provides an overview of what is important, not necessarily identifying elements missing from participants' care in the hospitals included in these discussion groups. The report should be read as a summary of what is important and used as a tool for reaffirming good practices already in place, as well as identifying additional avenues for addressing weaknesses at any Australian hospital.

The primary outcome from this research is recognition that the most important aspects of hospital care change as patients' situations change. At the time of admission, being settled in a ward quickly is perceived as essential. Patients do not feel they have really been treated, nor do they feel they can commence healing until they are settled in the ward.

During the hospital stay relationships with staff are critical in determining patient perception of care. Confidence in staff abilities, as well as being treated with courtesy and respect, are tightly linked to helping patients feel integrated with their care program and able to ask questions of staff caring for them.

As patients begin to heal and feel well planning for discharge becomes the most important issue. Participants are curious about preventing a recurrence of the illness, as well as preoccupied with ensuring they make appointments with specialists when appropriate after discharge. Most participants felt they did not have enough information about after-hospital care.

In summary, both the Monash Medical Centre and the Royal Melbourne hospital met most needs and expectations of all group participants. The primary areas for improvement at the RMH included better access to showers in some wards and increased evidence of cleanliness. At the MMC the sample was too small to identify particular issues needing change. Both hospitals performed exceedingly well in terms of staff relations with patients.

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2 The Royal Melbourne Hospital discussion group was attended by seven participants and the Monash Medical Centre group by only three participants. All results are combined to provide an overview of the broad issues important to medical in-patients.

Executive Summary

This project set out to identify the primary broad issues of importance in hospital care as perceived by recent Medical in-patients admitted to the Royal Melbourne Hospital (RMH) and Monash Medical Centre (MMC).

Overview of the methodology

Two focus group discussions were held with recent Medical in-patients and/or their primary carers. Patients invited to attend the groups had been admitted for more than three days between one to six months ago. The groups were held in the last two weeks of October 2000.

The discussion group for the Royal Melbourne Hospital was held at a function room in a nearby hotel, the Monash Medical Centre group was held in a meeting room at the MMC.

Due to strict confidentiality protocols at both hospitals, recruitment of patients for participation in the discussion groups was conducted by hospital staff.

Summary of results

The admission process

All patients were admitted through the emergency room and felt the wait for admission to the ward was too long. Participants wondered why more staff were not hired so additional wards could be opened to avoid 12-24 hour waits.

- Patients do not feel they are being treated, nor do they start to recover until they are settled in a ward.
- All participants felt admission to the ward was appropriate for their condition, none feeling they could have been sent home to manage their condition rather than being admitted.

Being a patient

Participants were thankful the hospital was there when they needed it, describing it as a "faithful dog" or "watch dog" – protective and reliable. However, being a patient was lonely and depressing, not simply because of illness, but because there was little to fill the time once patients began to feel well.

- Patients would appreciate having an activity to attend once they were well enough to get up during the day. Activities such as illness information classes or physical exercise were suggested.
- Patients saw value in placing patients who were more independent together. Nursing staffing levels could be focussed on less well patients, where they were more often needed, and those who were stronger could get more rest – not being disturbed by those who were in great pain.
- At the RMH some wards had very limited shower facilities and patients reported having to share 2-3 showers between up to 20 patients. Most patients want to use the shower at the same time of the day and so would find themselves waiting in line for a shower.
- There was a lack of evidence of cleaning staff at the RMH and patients perceived the hospital was unclean, even remarking it was "*unhygienic*".
- Patients spend most of their time in the ward room, staring at the walls. Simple means of presenting a cheerful and comfortable atmosphere would be strongly appreciated.

Staff relations

The most important element of staffing was ensuring that patients felt confident in staff abilities and were treated with courtesy and respect. In these two discussion groups there were no complaints or problems with any elements of staff relations.

- Participants perceived that there were insufficient staff, especially during night shift when participants often waited a very long time for assistance. Participants reflected that staff were doing the best they could under the circumstances of low staffing levels.
- There was a lack of understanding of why the hospital could not hire more staff.

Dissemination of information

Most participants received the appropriate amount of information at the right time. When information was not forthcoming patients were left feeling anxious, often surmising that their condition or situation was worse than it really was.

Discharge planning

This element of hospital care became increasingly important as patients began to feel better and think about going home.

- Although patients would have been given information about treatment, symptoms and when to make medical appointments after discharge, few participants recalled being given this information. Hospitals would benefit by creating methods for retention of this information.

How to Read the Report

The discussion groups on which these findings are based were directed in the relative order of experiences during a hospital stay. This report is written in a similar order and section topics include:

- the admission process;
- staying in the ward;
- discharge planning; and
- considering the most important aspects of the hospital stay.

Discussions were detailed and broad ranging. This report illustrates the context of responses thereby providing depth of understanding of the participants' point of view. Few quotes are utilised to avoid identifying individual patients out of a very small sample.

Disclaimer

Please note that, in accordance with our Company's policy, we are obliged to advise that neither the Company nor any member, nor employee undertakes responsibility in any way whatsoever to any person or organisation (other than the Clinical Epidemiology and Health Services Evaluation Unit – Melbourne Health) in respect of information set out in this report, including any errors or omissions therein, arising through negligence or otherwise however caused.

Background and objectives

Research design

Campbell Research & Consulting was commissioned by the Clinical Epidemiology and Health Services Evaluation Unit – Melbourne Health (CEHSEU) to examine the issues of importance to Medical in-patients during their hospital stay. The format of small discussion groups was deemed to be the most appropriate methodology and two different hospital sites were chosen for participation:

- Royal Melbourne Hospital
- Monash Medical Centre

Two discussion groups were held with patients and/or primary carers of patients. The RMH discussion group was held in a function room at a nearby hotel and the MMC group was held in a meeting room on site at the MMC.

Due to confidentiality protocols, staff at the individual hospitals were responsible for recruiting participants.

Participants were selected with the following criteria:

- patients / carers of patients who have been admitted to a Medical inpatient ward;
- admission for longer than three days; and
- admission within the past 6 months (between April – September 2000).

The types of conditions covered by these recruitment specifications generally apply to elderly patients above 65 years old.

A moderator's guide was developed in consultation with the CEHSEU to explore the areas generally perceived of as important to patients during their hospital stay, as well as areas deemed to be of interest to the relevant hospitals.

The current report provides a qualitative account of two focus group discussions conducted in the last two weeks of October 2000.

Description of the sample

A total of seven patients and three carers attended the two groups. Seven people attended the Royal Melbourne Hospital group and three arrived for the Monash Medical Centre group.[3]

A summary of discussion group participants is provided below in Table 1.

Table 1: Group discussion participants

Participant type	N	Admitted through Emergency Room
Patients	7 (6 males, 1 female)	7
Carers	3 (all female)	N/A
Total	10	7

Breakdown between hospital locations is not provided due to small samples and potential for identifying individual participants

Please note:

Due to the small sample in the MMC discussion group. Results from the two groups are combined and discussed together. Where there are particular issues relevant to either hospital are highlighted in the relevant section.

[3] Fourteen participants were invited to take part in the MMC discussion group. The poor attendance prompted researchers to telephone non-participants the following day to elicit reasons for the low participation rate. The main reason given for non-participation was that other appointments had been scheduled. In future, when participants are recruited for discussion groups the importance of commitment to this appointment should be emphasised more strongly.

The Admission Process

All patients were admitted through the Emergency Room (ER) and the process of admission generally went smoothly.

All participants reported that they felt they needed to be admitted to the hospital rather than trying to manage at home with support services. Participants (or carers) considered the conditions admitted for as "genuine emergencies" and consisted of events including:

- severe asthma;
- acute coronary conditions; and
- complications from earlier procedures.

In those cases where the nature of the illness at time of admission was unknown, patients felt quite strongly that they would not have managed by returning home, they felt much too ill.

> All participants came through the ER and felt admission was appropriate.

When considering issues surrounding admission, only one patient felt ignored, all others related they were well looked after and attended to frequently while waiting in the ER. The primary criticism of admission was the long wait in the Emergency Room before being admitted to the ward, most patients waiting around 12 hours and some waiting up to 24 hours.

Apart from long waiting periods, patients were happy with the ER staff and the way they were treated.

> Patients coming through the ER, and waiting to be admitted to a ward do not understand why additional beds can not be made available to avoid long waits on "trolleys".

Waiting in the emergency room also left patients feeling their treatment had not really started, so they could not yet begin to heal either. Patients felt they might be overlooked if their condition worsened, or the equipment needed to treat them might be up on the ward.

> The healing process may be delayed by the amount of time a patient spends waiting in the ER as patients do not feel their treatment has begun until they are in the ward.

Staying in the ward

What it's like to be a patient?

Not surprisingly, patients generally expressed they did not enjoy being a hospital patient. However all felt quite relieved that the hospital was there when it was needed. All patients were admitted to the hospital while they were feeling very unwell, and therefore "relief" was the emotion associated with being a hospital patient.

The most important thing patients feel the hospital can offer them is treatment – helping them to *"get well"*.

Participants were asked the question: *"If we were to describe the hospital as an animal, what type of animal would it be and why?"*

Response to this question was not difficult. One person stated the hospital would be like a *"faithful dog"* because it was always there for you, and another further clarified that it would be a *"watchdog"* – there to protect us and look after us. All other participants agreed with these analogies.

> The hospital is perceived to have the same qualities as a faithful dog or watchdog – there when you need it, providing protection and service when you are ill.

How did you spend your time?

Participants describe being a patient as *"lonely and depressing"*. This is not solely because they were ill, but primarily because there was very little to do once they began to feel well. Patients filled their time with:

- clock watching;
  - *"I counted every second of nearly every minute because I could not read or get up."*
- Reading;
- Watching television;
- Waiting;
  - *"People can't come to visit all the time, they have their lives to live"*
- Looking for people to socialise with.
  - *"Once I was able to get around I went looking for people to talk to, I didn't have any trouble finding people, but you do have to go and look for them."*

> ***Patient suggestion for change:***
>
> Patients would like something to do once they begin to feel well. They were favourable to the prospect of getting up during the day to do something – perhaps information classes about their illness, especially prevention of recurring problems.

Privacy

Participants felt their privacy was very important and rarely felt it was intruded upon. When privacy was an issue it was primarily during the night from the noise of other patients including:

- patients who were great pain;
- patients who snored loudly; and
- patients who were dying.

Patient suggestion for change:

Could patients who are 'less well' be placed together, and those who are more independent placed together? Healthier patients would be able to rest better, being less disturbed during the night by those who are more unwell, and have others to socialise with.

Locating less well patients together might also allow the hospital more effectively to concentrate nursing staff in those areas.

Physical features of the hospital

Discussion of physical features did engender differences between the two hospitals participating in this research. Monash Medical Centre, being a newer facility, was not criticised.
Overall, newer wards and facilities were perceived to be cleaner and more hygienic.

Access to showers and toilets

Access to shower facilities was very limited in some RMH wards and patients mentioned:

- waiting in line (in the hallway) to share two or three shower stalls between patients in large wards;
- asking staff to let them know when a shower was available; and
- utilising the opposite gender showers when vacant.

Toilet access did not pose a problem.

General appearance of the ward

Older wards in the RMH were noted as looking "run down" and depressing. While participants would like the rooms to look fresh and clean, they would prefer money to be spent on staffing rather than expensive décor. Simple solutions are favoured, one patient mentioning the presence of plants or fresh flowers might make a big difference.

Patients spend a lot of time in their hospital rooms and therefore décor, atmosphere and comfort is important to them.

The RMH was also considered *"unclean"* in some sections. This was more a problem in the older areas of the hospital. However all RMH participants mentioned that they rarely saw any cleaning staff and some questioned whether they hospital might be *"unhygienic"* because they did not see any cleaning staff.

Patients form opinions of hospitals and their hygiene levels based on the frequency with which they see cleaning staff.

Staff relations

General confidence and care

All participants had the highest praise for staff. Most were emphatic that they could not say a bad word about the good intentions of the staff. In particular, participants liked:

- the way they were spoken to;
- the way information was given to them;
- being addressed by their first name; and
- being allowed to call staff by their first name.

"Being on a first name basis helps to break down the barriers and helps me to feel more comfortable."

The flip side to the extensive positive praise of staff is the qualifier:

"They are doing a good job under the circumstances."

Most participants had experience with hospitals prior to the current episode for which they were invited to attend the discussion. Many had a long history of hospitalisation over the past 20 years and noticed many changes in staffing levels during that time. Participants mentioned there were far fewer staff available for patients compared with past staffing levels. This was particularly noted during the night shift.

> It is sometime difficult to separate the positive praise for staff when patients and carers allow a certain degree of "understanding" for problems that may arise due to a perceived lack of staff.

Other staffing issues of concern mentioned by participants included:

- staff who appeared to lack training and skills by asking the patient how to apply certain bandages; and
- frequent visits by training/ research staff - overall, patients do not mind being visited by researchers but many found themselves providing the same information repeatedly to multiple training/ research staff on the same day.

Dissemination of information

Most participants felt they received the right amount of information at the right time. However, when information was not forthcoming it left participants experiencing a great deal of fear. For example, they were anxious about the following:

- signs to look for in case of illness recurrence;
- not fully understanding how several conditions affect each other;
- imagining every ache in their body is a sign that an organ is just about to fail;
- wondering how an illness may affect physical functions in the future; and
- the amount of medication given, or whether staff were consistent in their dosages.

As a very good reflection on the hospitals, there were very few instances when participants felt uninformed. However it is worth emphasising the importance of information sharing to patients in these areas.

> Being left "not knowing" about a condition generates a high level of anxiety in patients/carers.

Discharge planning

Participants who were offered assistance with discharge planning found this to be a highly valuable service. Those who had not received assistance were surprised to hear what services were available including:

- assessment for in-home support services;
- regular visits from the nurse; or
- assistance planning who would help to look after them at home.

In addition to the physical aspects of caring for themselves at home after discharge, most participants felt their basic questions about managing their health were left unanswered.
Patients were most likely given the information needed for follow-up care, however they did not retain the information easily. Additional methods for distributing this information may need to be considered.

All participants felt they needed more information about follow-up care including:

- when to make appointments after their hospital stay;
- who to see about their condition after discharge (ie GP or specialist);
- how often they should attend a medical practitioner; and
- what symptoms to look out for to prevent recurrence of the condition.

Patient suggestion for change:

Discharge planning becomes most important as patients begin to feel better. Participants thought a simple card stating the basic follow-up information would be helpful.

Additionally, patients would like to attend information classes about their illness and managing their health prior to going home.

The *most* important aspects of the hospital stay

At then end of the discussion, after considering the important aspects of a hospital stay, participants were asked to try to arrange a list of elements commonly perceived of as important during a hospital stay. They attempted to arrange them in relative order of importance.

In Figure 1 the priority needs of patients/carers are arranged in four levels:

- Level A – quick admission;
- Level B – feeling comfortable and secure that they are being well-looked after;
- Level C – discharge planning; and
- Level D – assumptions of hospital care.

Level A: Quick admission

Identifying the most important element coincided with ensuring patients would be looked after. By securing a bed in the ward participants felt their needs would be met sooner. Participants felt a large amount of anxiety as they waited to be admitted, often concerned that their illness would progress and no one would notice, or they would be in the wrong place for the proper treatment.

Level B: Confidence in staff and comfort in the ward

In Level B participants found it very difficult to separate what was "most" important for them, major issues intermingling during different stages of the hospital stay.

- Confidence in staff abilities was largely assumed and there were very few instances where participants felt their confidence had been undermined. However since serious illness was the primary reason for attending the hospital confidence in staff abilities must be forthcoming.
- Respect and courtesy from staff was very important and none of the participants raised any problems in this area.
- Being fully informed and feeling able to ask questions flows on from confidence in staff and being treated with courtesy and respect. Patients and staff addressing one another by first names also assisted with communication flows and general respect for each other.
- Feeling comfortable in the room was important and a function of the amount of time spent in the room.

Level C: Discharge planning

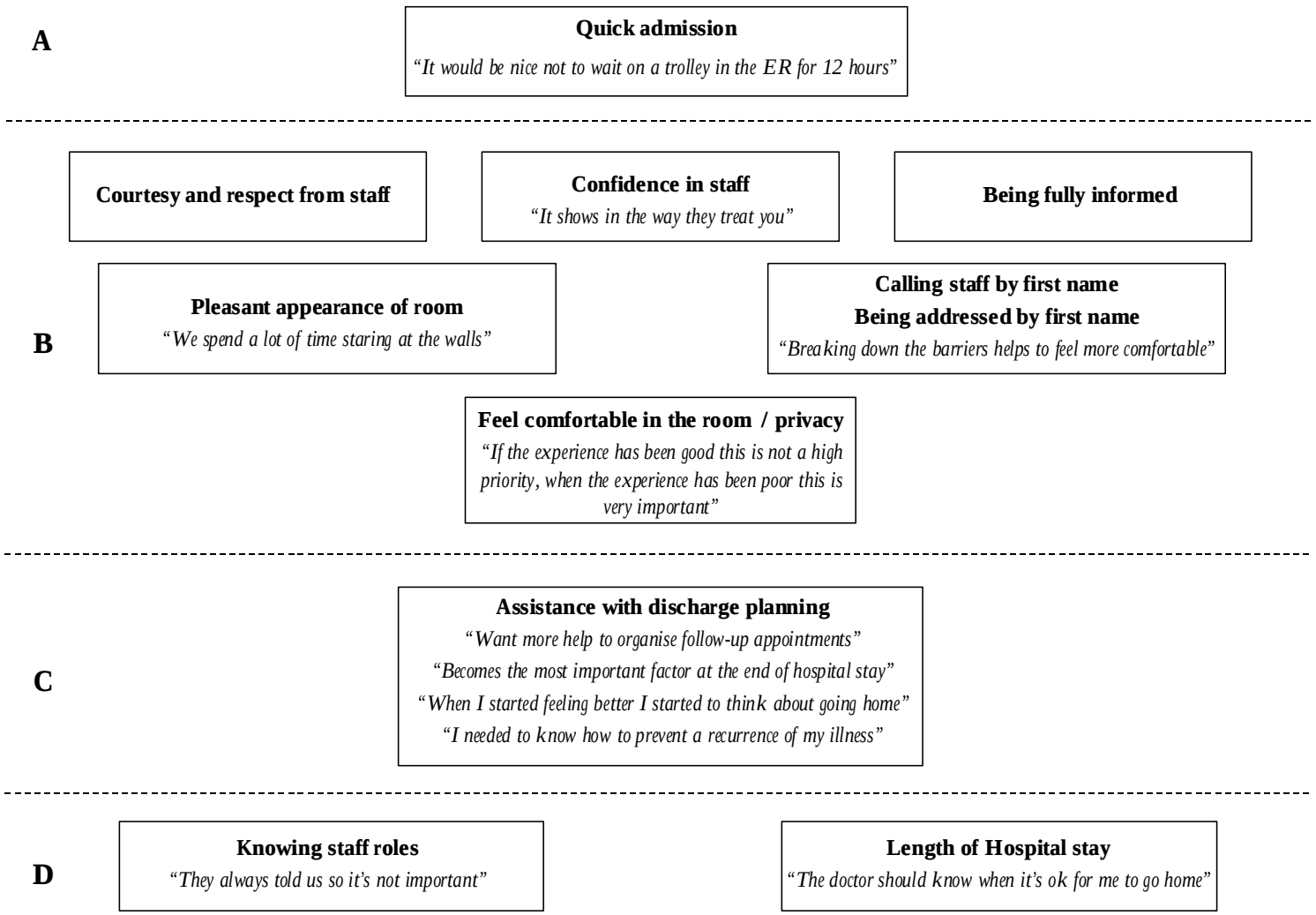
Participants did not necessarily believe discharge planning was less important than issues in levels A or B, however discharge planning arose near the end of the stay when patients were becoming well, and therefore was not perceived to be critical to their hospital care. Participants strongly emphasised that as they got closer to going home discharge planning became the primary issue of importance.

Level D: Expectations

There were several items patients encountered few problems with and simply *expected* to occur. All participants agreed that length of hospital stay was best assessed by hospital staff, they would not consider having greater input to this decision. All felt the length of stay was right for them.

Additionally, whenever staff came to do something with the patient they introduced themselves and informed participants of what was happening. Participants felt fully informed about staff roles and therefore did not feel this was a higher level of importance than other issues.

Figure 1: Priorities of hospital care – through the patients' eyes



Conclusion

The themes discussed here were the most prominently expressed opinions of group participants. Many participants were hesitant to identify problems with their stay, however once allowed to comment openly and positively they could then begin to reflect on potential changes to be made. Participants were assisted by being asked to think about a new hospital and what could be done better.

At the base of the discussions it repeatedly came down to being informed about what was happening to them as patients. As long as patients were informed they could understand and perhaps even offer solutions to the problems themselves (as identified in highlighted *patients' suggestions for change*).

Topics of information required during a hospital stay also changed alongside the wellness level of the patients. Perceptive staff, or implementing routine procedures at various stages of healing could efficiently address changing information needs.

Appendix 2 Charleson Index Co-morbidities Definitions

Myocardial infarction includes patients with one or more definite or probable myocardial infarctions; these patients had been hospitalised and had electrocardiographic and /or enzyme changes. Patients with electrocardiographic changes alone were not designated as having had an infarction.

Congestive heart failure includes patients who have had exertional or paroxysmal nocturnal dyspnoea and who have responded symptomatically (or on physical examination) to digitalis, diuretics, or after-load reducing agents. It does not include patients who are on medication but have had no symptomatic response and no evidence of improvement of physical signs.

Peripheral vascular disease includes patients with intermittent claudication or those who had a bypass for arterial insufficiency, those with gangrene or acute arterial insufficiency and those with an untreated thoracic or abdominal aneurysm (6cm or more).

Dementia includes patients with chronic cognitive deficit.

Cerebrovascular disease includes patients with a history of a cerebrovascular accident with minor or no residual and transient ischaemic attacks.

Chronic pulmonary disease includes patients with mild, moderate and severe pulmonary disease as defined. Mild pulmonary disease includes patients who are dyspnoeic with moderate activity without treatment or those who are dyspnoeic only with attacks (e.g. asthma)]. Moderate pulmonary disease includes patients who are dyspnoeic with slight activity, with or without treatment and those who are dyspnoeic with moderate activity despite treatment. Severe pulmonary disease includes patients who are dyspnoeic at rest, despite treatment, those who require constant oxygen, those with CO_2 retention and those with a baseline PO_2 below 50 mmHg.

Connective Tissue Disease includes patients with Systemic Lupus Erythematous, Polymyositis, mixed connective tissue disease, Polymyalgia Rheumatica and moderate to severe Rh A.

Peptic ulcer disease includes patients who have required treatment for ulcer disease, including those who have bled from ulcers.

Mild liver disease consists of cirrhosis without portal hypertension or chronic hepatitis.

Diabetes includes diabetics treated with insulin or oral hypoglycaemic, but not diet alone and who do not have end organ damage.

Hemiplegia whether it occurred as a result of a cerebrovascular accident or other condition.

Moderate or Severe renal disease includes patients with serum creatinines of >3mg% and includes patients on dialysis, those who had a transplant, and those with uraemia

Diabetes with end organ damage includes patients with retinopathy, neuropathy or nephropathy.

Tumour consists of patients with solid tumours without documented metastases but initially treated in the last 5 years including breast, colon, lung and a variety of other tumours (exclude non melanotic skin cancers).

Leukaemia includes patients with acute and chronic myelogenous leukaemia, acute and chronic lymphocytic leukaemia, and polycythemia vera.

Lymphoma includes patients with Hodgkins, lymphosarcoma, Waldenstrom's macro-globulinaemia, myeloma and other lymphomas.

Moderate or Severe liver disease includes patients with cirrhosis, with portal hypertension and with a history of variceal bleeding.

Metastatic Solid Tumour includes patients with metastatic solid tumours including breast, lung, colon and other tumours.

Acquired immune deficiency syndrome includes patients with definite or probable AIDS ie. AIDS related complex.