



NORTH WESTERN HEALTH

Clinical Epidemiology and Health Service Evaluation Unit

Hospital in the Home Costing Study

Summary Report

**By the North Western Health Consortium
For the Acute Health Division, Department of Human Services, Victoria**

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Foreword

This study was conducted by the North Western Health Consortium for the Quality Branch, Acute Health Division of the Department of Human Services. The project management and infrastructure was based at the Clinical Epidemiology and Health Service Evaluation Unit of North Western Health. The Department of Community Health and the Victorian Infectious Diseases Service also provided infrastructure support in the early parts of the study. The study commenced in May 1998 and concluded in October 1999.

1.1 Executive Summary

Hospital in the Home Costing Study

Hospital in the Home (HITH) programs substitute in-home care for an acute episode of care which would otherwise be conducted in an in-hospital ward setting.

The Hospital in the Home Costing Study examined the costs and outcomes of HITH care across the range of sites, programs and clinical settings in Victoria.

Aims

The aims of the study were to:

1. Identify costs and outcomes associated with Hospital in the Home management compared with in-hospital care.
2. Assess the extent to which Hospital in the Home care can be provided within existing models of casemix funding
3. Recommend ways to facilitate the long term viability of Hospital in the Home care

Methods

The costs for 1600 episodes of care provided in HITH were compared with matched in-hospital episodes of care. The episodes were identified from the Victorian Inpatient Minimum Database (VIMD) for the period July to December 1997. The matching process sought to identify episodes of in-hospital care which were sufficiently similar to HITH episodes, ie, the HITH episode became a substitution for an in-hospital episode. Episodes were matched by hospital, patient gender, ANDRG, number and type of co-morbidities, and date of episode (within 3 months).

Costings for the episodes were undertaken using computerised clinical costing systems (where available). At the remaining sites a manual costing method was used which mimicked the most commonly used computerised clinical costing system (TransitionTM). An activity based costing methodology was used to derive unit costs.

This was followed by hypothetical modelling of the cost of HITH had it been delivered in hospital. Eight hundred HITH episodes were randomly selected and modelled assuming the patients each received the same treatment in an in-hospital ward. This was to provide a standard point of comparison for HITH and in-hospital treatment (non-HITH). To examine HITH programs and their associated clinical features and costs, analyses were conducted after stratification on the basis of location, program type and type of episode substitution.

After adjustment for potential confounding factors including age, type of condition and severity, treatment type and length of stay, a statistical modelling exercise was also undertaken using the complete sample of matched HITH and non-HITH episodes to determine the costs of HITH in comparison with non-HITH matched episodes. As part of the adjusted cost analysis, the predictors of total episode cost and length of stay in HITH were also identified. Mortality and length of stay were also compared for HITH and non-HITH episodes.

Qualitative research undertaken as part of the HITH costing study included key informant interviews with HITH coordinators and hospital financial managers and focus group interviews



with referring clinicians at four different HITH sites in Victoria. The qualitative research was undertaken to examine the factors, which affect clinicians' decisions to refer patients to HITH, including the potential interaction between financial and clinical factors.

From an original sample of 1533 HITH episodes identified from the VIMD, 977 non-HITH episodes were identified as suitable matched episodes. Costings data were then generated for 924 pairs of episodes. The cost modelling exercise was undertaken for a sample of 800 fully costed HITH episodes where it was assumed that the same treatment had been provided in a ward in the same hospital rather than the HITH setting.

Principal findings from the HITH Costing Study are:

1. The HITH cost comparison exercise demonstrates that overall the HITH program can be delivered within the existing casemix funding system.
2. The clinical pattern of use of HITH is heterogeneous and can be defined as either a total episode substitution for an episode of acute care which would otherwise have been provided as in-hospital care (pure HITH) or a partial episode substitution for part of an episode of acute care which was provided as in-hospital care (mixed HITH).
3. The conditions commonly managed in HITH as a total episode substitution (pure HITH) include chemotherapy, intravenous antibiotic treatment of cellulitis, genito-urinary tract or respiratory tract infection, and the administration of anticoagulant therapy. For other groups of conditions there is a mixture of use of partial and total episode substitution (pure and mixed HITH).
4. Overall HITH is significantly cheaper than its matched non-HITH (in-hospital) care and average daily costs are cheaper for both mixed and pure HITH.
5. Ward level nursing costs account for the largest proportion of total episode cost (TEC), the unit cost of HITH is comparable to the lowest level of nursing dependency on the ward.
6. The reported mortality rate in HITH and non-HITH was not significantly different.

Pure HITH

7. For pure HITH (total episode substitution), HITH care is cheaper than in-hospital care across all sites and conditions.
8. Pure HITH is 38% cheaper than in-hospital episodes, after adjustment for potential confounders.
9. Length of Stay (LOS) is shorter or the same for pure HITH compared with non-HITH

Mixed HITH

10. For mixed HITH (partial episode substitution) the picture is more complex because of the differences in clinical features related to case selection for HITH as a partial episode substitution.
11. The total episode LOS for mixed HITH is greater than for its matched in-hospital episode. This is due to longer in-hospital LOS prior to transfer to HITH.
12. Mixed HITH total episode cost is not significantly different than non-HITH after adjustment for potential confounders. The strongest confounder is LOS.



Episode costs by condition

13. Chemotherapy, cellulitis, respiratory conditions, venous thrombosis, kidney or urinary tract infections, and less complex post-surgical conditions were consistently cheaper to provide in HITH than in-hospital across all sites. Savings in infrastructure related costs are likely explanations for the savings in nursing and medical costs.
14. HITH care for complex neonatal care, post-operative management following hepato-biliary surgery and gynaecological procedures was more expensive than matched non-HITH episodes of care in the sample, probably due to a longer length of in-hospital ward stay prior to transfer to HITH. The difference in cost of post surgical treatment for hepato-biliary surgery, when HITH and non-HITH were compared was not consistent across all sites. The management of malignant skin conditions in HITH was more expensive than in non-HITH at all 8 sites sampled for this group of conditions, having both higher nursing costs and a longer overall length of stay.

Episode costs by hospital type

15. An analysis of TEC undertaken by grouping hospital by size, location and degree of specialisation showed that:
 - For pure HITH, TEC at the Rural 2 (smaller rural sites) group was greater than at the Metro 1 (tertiary teaching and specialist hospitals) and Metro 2 (secondary metropolitan hospitals) groups
 - For mixed HITH, TEC at the Metro 1 (tertiary teaching and specialist hospitals) group was greater than at all other groups
 - For non-HITH, TEC at the Metro 2 group of sites was lower than at Metro 1 and Rural 1 hospital (larger regional centres) groups.

Episode LOS by hospital type

16. An analysis of LOS undertaken by grouping hospital by size, location and degree of specialisation showed that:
 - For pure HITH, Metro 1 group had a lower LOS than all other groups
 - For mixed HITH, Metro 1 group had a higher LOS than Metro 2 and Rural 2 groups
 - For non-HITH, Metro 2 group had a lower LOS than Metro 1 and Rural 1 groups.

Qualitative findings

17. The qualitative research conducted as part of the HITH costing study, demonstrates that there is a very high level of acceptance of the HITH program by referring clinicians, financial administrators and HITH providers.
18. An explicit feature of HITH programs in general is the importance of the HITH coordinator as a driver of the acceptance of the HITH clinical programs by referring clinicians.
19. Referring clinicians attach little importance to financial issues as opposed to clinical issues in deciding to use HITH. Clinicians refer patients to HITH on the basis of the type and severity of the presenting clinical condition, the availability of a suitable treatment in the HITH program and the social circumstances of the individual patient concerned.
20. A factor of concern to referring clinicians is the fact that HITH is not available to privately insured patients.



21. Although no specific attempt was made to incorporate the consumer perspective in the analysis, the qualitative work undertaken suggests that the consumers (patients and carers) are very satisfied with the level of service provided in HITH programs. This is consistent with previous studies.

Conclusions

Hospital in the Home is a safe, acceptable and cost-effective alternative to acute in-hospital care for a wide range of clinical conditions.

The HITH cost comparison exercise demonstrates that overall the HITH program can be delivered within the existing casemix funding system.

The appropriate use of HITH needs to be viewed from the clinical decision-making perspective. Access to HITH as a total episode substitution (pure HITH) is determined at the point where a decision is made to admit the patient to hospital. In comparison, access to HITH as a partial episode substitution (mixed HITH) is determined at the point where a decision is made to transfer a patient home from an in-hospital episode of care. These are fundamentally different considerations. Monitoring eligibility and acuity criteria, ensuring early notification and transfer, and coordinated access to other services can ensure appropriate use of HITH.

Finally, based on these costs, outcomes and a qualitative examination of factors affecting the clinician's decision to use HITH, recommendations to facilitate the future development and viability of Hospital in the Home are listed below.

1.2 Recommendations for the Future

Recommendations are listed for DHS policy, hospital practice and research to inform the development of Hospital in the Home in Victoria.

DHS Policy

1. Promote the integration of Hospital in the Home, as a cost-effective alternative to ward-based care, in acute hospitals across Victoria.
2. Continue to fund Hospital in the Home services through casemix funding for all conditions.
3. Provide funding to support HITH in Victorian hospitals. This may include medical and nursing leadership, coordination of services, training and education, as well as administrative support.
4. New initiatives to build capacity may include guideline development, collection of a minimum dataset, and the identification of new conditions and settings suitable for Hospital in the Home.
5. Review the causes of inappropriate use of Hospital in the Home (and hospitalisation), such as limited availability of more appropriate non-acute community services, in order to achieve the optimal mix and responsiveness of services to meet patients' needs and prevent hospitalisation.
6. Explore options for treating private patients in Hospital in the Home.

Hospital Practice

7. Promote the integration of Hospital in the Home, as a cost-effective alternative to ward-based care, in acute hospitals across Victoria.



8. Take into account the differences between Hospital in the Home as pure HITH (total episode substitution) and mixed HITH (partial episode substitution) when planning HITH service development.
9. Patients who are eligible for mixed HITH (partial episode substitution), should be identified, transferred into HITH and discharged as early as possible, in order to optimise cost-effectiveness. Clinical practice guidelines and acuity measures could facilitate this.
10. Promote medical leadership to encourage clinician ownership and medical management of Hospital in the Home patients.
11. Develop standardised Victorian guidelines for common treatments provided in Hospital in the Home.
12. Collect a Hospital in the Home minimum data set to address transparent accountability in relation to hospitals' business management and quality improvement.

Research

13. Develop acuity measures to monitor eligibility for Hospital in the Home.
14. Review the evidence and conduct further research to compare the costs and patient acceptability of chemotherapy in Hospital in the Home and other ambulatory models.
15. Further explore the most cost-effective ways of providing medical management and nursing care in Hospital in the Home.
16. Develop and promote standard costing methodologies so that Hospital in the Home can be compared between hospitals and with other services.
17. Identify costs of Hospital in the Home and their impact on consumers and carers, compared with in-hospital ward care.



1.3 Background

From its early beginnings, medical care was largely delivered to those with an acute condition within a familial setting. During the twentieth century, there have been major shifts in the location of delivery of health care services. With increased medical knowledge and the advent of specialised invasive treatments, health care practitioners have utilised hospitals to deliver acute care.

The cost of treating inpatients, particularly those with acute conditions, in a traditional hospital setting has increased over the past few years. In the last few decades, hospitals have responded to increasing service demands and fiscal pressures by looking for ways to decrease the load on acute hospital beds – eg through early discharge, day procedures, ambulatory care and home-based acute care.

Trends in Healthcare

pressures to reduce costs of health care ¹⁴

changes in funding to shift care from hospital to the community setting

new therapies, equipment and information technology ¹⁵

social values in support of patient choice with participation in treatment and prevention

patients' preference to be treated at home instead of in an in-hospital ward

Home-based hospital-type care has evolved in many countries in response to several trends in health care.^{46 47 15} These programs have been defined as providing 'intensive levels of care for acutely ill people in their own homes',¹³ or care in the home to people who would otherwise be occupying a hospital bed.¹²

The programs are variously known as “Home Care” in the USA, “Hospital-at-Home” in Britain and Europe, “Extra-Mural Hospital” in Canada and New Zealand, and “Hospital in the Home” in Canada.⁴⁸

In the early 1990's, Hospital in the Home (HITH) services were established in New South Wales,⁵¹ South Australia⁵² Tasmania and Victoria.



Hospital in the Home (HITH)

In 1994, the Victorian Department of Health and Community Services (now called the Department of Human Services) established a pilot HITH program with incentive funding of \$8 million to public hospitals to provide hospital level care in community-based settings (mostly in patients' own homes, but also in nursing homes).

Hospital in the Home is a program in which selected types of health care can be delivered in the home to suitable, consenting patients who require inpatient hospital care.¹² In Victoria, Hospital in the Home substitutes for an acute hospital admission and delivers a wide range of services to patients with diverse clinical conditions.^{6 16}

HITH is considered a hospital ward, and patients receiving such care are viewed as inpatients. With patient consent, and utilising the appropriate selection criteria,²⁵ HITH may provide both safe and effective care for patients. Studies have shown the clinical effectiveness of HITH care for several conditions including cancer^{53 54}, heart failure⁵⁵ and infections.⁵⁶⁻⁵⁹

Studies have also shown that both perceived quality of life and patient satisfaction are greater in HITH than an in-hospital ward.^{18 19 22 23} The home environment has been found to be more stimulating for the patient, and to enhance appetite, physical activity, sleep and social functioning during treatment.^{21 24}

However, the cost-effectiveness of Hospital in the Home care is still debated. This is partly because HITH is not a homogeneous entity, and evaluation studies have focused on different service models, conditions and treatments ranging from acute to post-acute and rehabilitation.^{26 27}

Previous Costing Studies

Some studies have shown that HITH does not reduce total costs.²⁸ One study determined that although HITH is cheaper per day, it requires longer length of stay, so that the total cost of HITH is higher.²⁹ Other studies have shown that the cost of HITH is equivalent to, or less than in-hospital care.^{14 18 30-32}

The KPMG costing study of the Hospital in the Home pilot program in Victoria, in 1996, concluded that the costs of HITH were equivalent to the costs of in-hospital ward care,⁶ but limitations to the methodology of the study were identified. In addition, the study was conducted during the early years of the program when patient throughput was lower.²⁶

The results of these studies, however, are not necessarily comparable, as they were conducted on diverse patient groups. In addition, the randomised, controlled study methodology has only been used to study homogeneous patient groups.¹⁸⁻²⁰

Limitations of the validity and generalisability of previous costing studies have been identified by several authors.^{15 26 33-35} Previous costing studies displayed inconsistencies in cost methods between HITH and institutional costs. Prospective studies commonly measured actual direct inputs for HITH episodes and compared these to average direct inputs for control episodes.^{6 14 31}

The KPMG study used 3 different methods to collect direct staff time in wards (ranging from estimates of actual time, to averages), which it compared to actual HITH visit times. Other studies have compared HITH costs to costs derived from the hospital's average DRG cost. However, such broad-based comparisons have severe limitations and do not adequately distinguish between HITH



patient types which may be less complex (pure HITH) or more complex (mixed HITH) than the average for a given DRG.

Rationale for the Hospital in the Home Costing Study Methodology

The Hospital in the Home Costing Study addressed these problems by adopting a consistent costing method for comparable cost components for in-hospital care and HITH care. Also, this study took the heterogeneity of HITH into consideration by including the significant proportion of patients who have less common services and diagnoses.

While costing is essential for determining the financial viability of HITH, an important factor that will determine its long-term viability is its utilisation by clinicians and hospital managers. Therefore, this study also considered how cost and other factors impact upon decision making at the clinical level.

The examination of costs to the patient and carer, while important, was outside the scope of this study.

The primary aims of the study were to:

1. identify costs and outcomes associated with Hospital in the Home management compared with in-hospital care.
2. assess the extent to which Hospital in the Home care can be provided within existing models of casemix funding
3. recommend ways to facilitate the long term viability of Hospital in the Home care

1.4 Methodology

Sample

A sample of 1600 consecutive HITH episodes between July and December 1997 was selected from the Victorian Inpatient Minimum Dataset (VIMD). A computer generated algorithm was used to match these to non-HITH episodes to ensure some validity in the cost comparisons between HITH and non-HITH episodes.

Factors including hospital code, age (within 5 years), sex, principal diagnosis, number and type of co-morbidity, number of diagnoses, and date of episode (admission date within 3 months) were used as criteria for matching. This provided 1533 available pairs of episodes from 41 hospitals. Of these, 14 were excluded as they came from 3 remote hospitals with less than 5 episodes each.

The suitability of the remaining 1519 pairs of episodes was confirmed by medical record review. Only 977 HITH episodes were successfully matched in this way. The final sample, therefore, consisted of 977 pairs of HITH and non-HITH episodes. Of these, a further 53 pairs (106 episodes) were excluded from cost analysis, due to the inability of 3 hospitals to supply the required data.

Cost Analysis & Hypothetical Modelling

Costing was performed for 924 pairs (1848 episodes) using clinical costing systems, (Transition™, CMIDS or Trendstar) of HITH and non-HITH where available. Forty percent of the sample required manual costing because clinical costing systems were not used at these hospitals. An activity based costing methodology was used to derive unit costs.

This involved extracting 'total operational expenditure' from the hospital general ledger, allocating direct and indirect costs to departments, defining cost structures for intermediate products, and applying mathematical formulae to the cost structures defined for intermediate products to determine unit costs. Job order costing methodology was then used to derive total episode cost (TEC) from the sum of unit costs for all intermediate products consumed in the patient episode.

This was followed by hypothetical modelling of the cost of HITH, had it been delivered in hospital. We randomly selected and modelled 800 HITH episodes assuming they each received similar treatment in an in-hospital ward. This was to provide a standard point of comparison for HITH and in-hospital treatment.

A database was compiled using VIMD data, containing clinical information abstracted from medical records, and the costing data for HITH episodes, non-HITH episodes and modelled non-HITH. The costing data from the sampling and modelling processes for HITH and non-HITH forms of episodes were then compared by groups of conditions and hospitals.



Pure HITH and Mixed HITH

The HITH sample was separated into pure (total episode substitution) and mixed (partial episode substitution) HITH. The total episode cost for pure HITH and mixed HITH were compared with the relevant matched non-HITH sample, using the Wilcoxon sign rank test.

Sensitivity analysis was then conducted on the crude costing data to address a number of anticipated limitations, and to test the robustness of the crude costing results. An economic analysis was performed to assess opportunities within the casemix funding framework for cost minimisation in mixed HITH episodes.

Adjusted Cost Modelling

To determine the true difference in cost between HITH and non-HITH, the costs need to be adjusted for the various other factors that have an independent effect on cost. Confounding factors are defined as those factors, which are associated with a predictor variable, and also exert an independent effect on the outcome of interest. The potential confounding factors tested included age, sex, length of stay, number of diagnoses, number of procedures, types of illness, types of treatment, stay in ICU or high dependency units, injury, death and rural location. Log-linear and multiple regression analyses were used to adjust for potential independent predictors of total cost (HITH and non-HITH), and to calculate the adjusted cost of HITH care compared with non-HITH care. The second part of this analysis examined HITH episodes only, and determined predictors of cost of HITH.

Despite best efforts to match cases of HITH to non-HITH, these confounding factors may be unevenly distributed between (and even independent of) these types of care. This means that a simple comparison of the crude cost of HITH versus non-HITH episodes may be invalid without identifying and adjusting for potential confounding factors.

The statistical methodology was designed to adjust the costs so that the true relative cost of HITH compared to non-HITH could be determined. Log-linear and multiple regression analyses were used to identify predictors of total episode cost for all episodes, including HITH and non-HITH. This was applied to the different models of HITH service delivery as identified in the KPMG Study (hospital, GP and mixed) ⁶, subcontracting of services to domiciliary nursing services, HITH length of stay, and pure HITH versus mixed HITH.

Mortality and length of stay were compared for HITH and non-HITH episodes using logistic regression modelling.

Qualitative Research

The HITH Costing Study was complemented by qualitative research involving program coordinators, referring clinicians and hospital finance managers in four hospitals which use different service delivery models. Focus groups and key informant interviews explored their views about factors affecting decisions to use HITH care for eligible patients, and the interaction between financial and other factors which impact on the clinical decision to use HITH.

1.5 Key Findings & Analysis

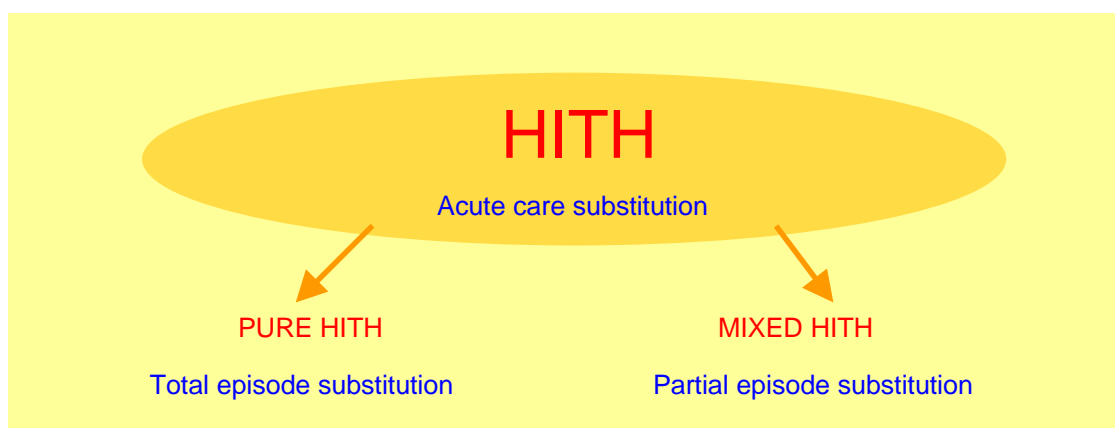
1.5.1 HITH Sample

1.5.1.1 HITH is a Heterogeneous Entity

HITH studies to date have defined HITH care as an homogenous entity – i.e. broad acute care substitution.^{14 18 20 28-32} The KPMG study, for example, only addressed specific conditions and models of care.⁶

The HITH Costing Study is the first to consider the heterogeneity of episodes treated in HITH by including significant proportions of patients who had a broad range of service and care requirements. The HITH Costing Study has shown that HITH is not homogenous and indeed consists of two distinct subgroups:

- 1) Pure HITH (total episode substitution)
- 2) Mixed HITH (partial episode substitution).



Pure HITH refers to episodes of care where patients are admitted and discharged purely through the HITH program. These patients do not enter an in-hospital ward and therefore HITH care constitutes a total episode substitution for an inpatient episode of care (TES).

Mixed HITH refers to episodes of care where patients are transferred into the HITH program after a period of in-hospital care. Mixed HITH care therefore constitutes a partial episode substitution (PES).

The patient mix, conditions treated, costs and length of stay in pure HITH and mixed HITH are very different. The pure HITH group is less complex and patients are less likely to be severely ill. The distinction between mixed and pure HITH does not appear to have been well addressed by previous studies.



Pure HITH

- Total episode substitution - patients admitted directly to the HITH program
- Patient treatment is less complex
- Cheaper for all conditions and type of hospital (rural and metropolitan)
- Lower total episode cost and LOS
- Lower daily cost

Mixed HITH

- Partial episode substitution – patients transferred (after an initial hospital admission) into the HITH program
- Two patterns of mixed HITH use as partial episode substitution:
 - a) Part of acute care treatment episode (eg post surgical care, postnatal care anti-coagulation, and home insulin stabilisation for diabetics following acute myocardial infarction)
 - b) For sicker patients with long length of stay due to complex problems, (eg treatment of complications with IV antibiotics or wound care) and a clinical need to facilitate the transition of such patients to home.
- Increased LOS for total episode, not due to HITH component
- Lower daily cost, adjusted TEC no different from non-HITH

1.5.1.2 DRG Distribution in HITH

This sample showed a distribution of conditions reflective of the total population of HITH episodes for 1997-98.



Thirteen DRGs accounted for 72% of the HITH sample, and the remaining 18% covered 138 DRGs. Day chemotherapy formed the largest proportion of episodes in HITH at 15%, due in part to the high number of repeat treatment episodes.

Conditions requiring intravenous (IV) antibiotics, or anti-coagulation such as cellulitis and deep venous thrombosis (DVT) made up the next largest group, followed by various conditions requiring post-surgical or wound care.

The sample included a high proportion (29%) of ungrouped conditions, which was reflective of the heterogeneity and uniqueness of the conditions treated through HITH.

The DRGs were distributed differently between pure and mixed HITH. The majority of episodes for day chemotherapy, the treatment of cellulitis, DVT, ear nose & throat (ENT), kidney & urinary tract infections (UTI) and cardiac medical conditions were managed in pure HITH.

In contrast, the majority of episodes for obstetric care, cardiac surgery, and the treatment of malignant skin conditions, leukaemia and lymphoma, and neonates were managed in mixed HITH. In episodes for respiratory, hepato-biliary, gynaecological procedures and all other DRGs, the spread of pure- and mixed HITH was more even.

The comparison below indicates how the particular conditions (or treatments) were managed in HITH programs across Victoria.

Table 1 Conditions grouped by DRG

Conditions grouped by DRG	Total Sample	%	Pure HITH split %	Mixed HITH split %
Chemotherapy	294	15	99	1
Cellulitis & other Skin	229	12	63	37
Obstetrics	166	8	33	67
Respiratory	106	5	56	44
Cardiac surgery	99	5	0	100
Deep venous thrombosis (DVT)	92	5	63	37
Gynecological procedures	83	4	55	45
Hepato-biliary conditions	76	4	46	54
Ear nose and throat (ENT)	71	4	69	31
Kidney & urinary tract infections (UTI)	72	4	75	25
Malignant skin conditions	39	2	5	95
Leukemia & Lymphoma	20	1	0	100
Cardiac medical	18	1	75	25
Neonate	15	1	0	100
All other DRGs	574	29	44	56
TOTAL	1954	100	54	46



DRGs commonly managed as pure HITH

The majority of episodes for day chemotherapy, the treatment of cellulitis, DVT, ear nose & throat (ENT), kidney & urinary tract infections (UTI) and cardiac medical conditions were managed as pure HITH episodes

DRGs commonly managed as mixed HITH

The majority of episodes for obstetric care, cardiac surgery, and the treatment of malignant skin conditions, leukaemia and lymphoma, and neonates were managed as mixed HITH episodes

1.5.1.3 Eligibility for HITH

Patient eligibility for HITH care is determined primarily by the need for acute care and the patient being clinically stable and not requiring 24 hour monitoring.

The HITH Costing Study qualitative research identified two key factors for determining treatment in the HITH program. These were:

- The nature and severity of the patient's illness, and how that illness will respond to treatment in the home environment
- Suitability of the home environment

The Nature of the Patient's Illness

The importance of the correct assessment of a patient's illness is paramount in deciding on patient involvement with the program. Although it is acknowledged that certain classes of illness are generally suited to HITH care, the degree or the severity of a person's illness was still a key factor, as is the practicality of treating the person's illness in the home as opposed to an in-hospital ward.

The Suitability of the Home Environment

Patients are deemed to be suitable for HITH care only if their home environment is assessed as being appropriate. The availability of carer(s) at home, the capacity of the patient to comprehend the requirements of being treated at home (including language barriers), and access to the home itself, are all decisive factors.

Standard eligibility criteria for HITH services will be necessary to ensure that HITH is used as an appropriate substitution for acute inpatient episodes of care. This will assist also in establishing criteria for comparisons in HITH service performance between hospitals. **We recommend** *acuity measures be developed to monitor eligibility for HITH.*

1.5.2 Costs

1.5.2.1 Total Unadjusted Episode Costs for HITH and non-HITH

The costing study aimed to identify costs and outcomes of HITH as compared with in-Hospital care.

To provide the cost comparison between HITH and non-HITH the study utilised an activity based costing methodology to derive unit costs. Job order costing methodology was then used to derive total episode cost (TEC) from the sum of unit costs for all intermediate products consumed in the patient episode.

Sample episodes were compared according to:

- total episode cost (TEC)
- length of stay (LOS)
- averaged daily cost (ADC)

“Pure HITH episodes were consistently cheaper than non-HITH, mixed HITH or modelled HITH across all types of conditions and across all sites.”

At each site, unadjusted cost comparisons were made between the non-HITH, total-HITH (includes both pure HITH and mixed HITH), pure HITH and mixed HITH. The subset of HITH episodes modelled as in-hospital episodes are referred to in the analysis as modelled non-HITH.

As shown in Table 2, the mean total episode cost (TEC) was \$4974 for HITH overall, in comparison with \$4394 for matched non-HITH and \$5467 for modelled non-HITH. However, there were significant cost differences between pure HITH, which comprised 54% of HITH episodes, and mixed HITH, which comprised 46% of the total sample of HITH episodes.



Table 2 Total episode cost, length of stay, and average daily cost for HITH, matched non-HITH and modelled non-HITH

Sample	Total episode cost \$		Length of Stay days		Average daily cost \$	
	Mean (95% CI)	Median	Mean (95% CI)	Median	Mean (95% CI)	Median
All HITH	4974* (4046, 5902)	1520	8.2 (7.2, 9.2)	4	570 (533, 605)	399
Matched non-HITH, all	4394* (3451, 5547)	1530	4.7 (4.2, 5.1)	4	854 (799, 910)	668
Modelled non-HITH, all	5467 (4450, 6485)	2018	8.1 (7.0, 9.1)	1	647 (605, 689)	487
	*p=0.784					
Pure HITH	1193** (1044, 1341)	714	3.3 (2.9, 3.8)	1	455 (411, 499)	328
Matched non-HITH, pure	3567** (2390, 4344)	1148	4.0 (3.4, 4.5)	1	661 (620, 701)	585
Modelled non-HITH, pure	1619 (1381, 1858)	922	3.3 (2.9, 3.8)	1	528 (475, 582)	405
	**p<.001					
Mixed HITH	9881*** (7851, 11911)	4704	13.6 (11.7, 15.6)	8	717 (660, 775)	525
Matched non-HITH, mixed	4450*** (3860, 5040)	2118	5.6 (4.8, 6.4)	3	1094 (984, 1203)	801
Modelled non-HITH, mixed	10603 (8365, 12841)	5990	14.3 (12, 16.6)	8	804 (742, 867)	608
	***p<.001					

Cost Analysis

Pure HITH was cheaper than matched non-HITH. Mixed HITH was more expensive than non-HITH. The mean TEC was \$1193 for pure HITH and \$3567 for non-HITH matched to pure HITH. In contrast, the mean TEC was \$9881 for mixed HITH and \$4450 for non-HITH matched to mixed HITH.

The unadjusted cost of pure HITH episodes was consistently cheaper than non-HITH, mixed HITH or modelled non-HITH across all conditions.

Unadjusted, mixed HITH total episode cost was higher than for non-HITH.

The averaged daily cost (ADC) was cheaper for pure HITH, mixed HITH and HITH overall compared with their non-HITH matches.

Modelled non-HITH consistently displayed higher costs than the HITH group. Thus, in the absence of HITH these episodes would have been more costly to treat as inpatients, assuming that the LOS was the same for those individual patients.

Averaged Daily Cost

HITH	\$ 570
matched non-HITH	\$ 854
 pure HITH	 \$ 455
matched non-HITH	\$ 661
 mixed HITH	 \$ 717
matched non-HITH	\$ 1094

Total Episode Cost (Mean)

HITH	\$ 4974
matched non-HITH	\$ 4394
 pure HITH	 \$ 1194
matched non-HITH	\$ 3567
 mixed HITH	 \$ 9881
matched non-HITH	\$ 4450



Total Episode Cost (TEC)

The unadjusted Total Episode Cost (TEC) of the total HITH sample was **not** significantly different from the non-HITH sample (Table 2). However the unadjusted TEC *for the separate* HITH groups (pure and mixed) showed significant differences in opposing directions:

Pure HITH was cheaper than matched non-HITH

Mixed HITH was more expensive than non-HITH

Length of Stay (LOS)

The mixed HITH episodes had a much longer Length of Stay (LOS) than their matched non-HITH episodes while the pure HITH episodes had a LOS which was not significantly shorter than the matched non-HITH episodes

Averaged daily cost (ADC)

The average daily cost for all HITH groups (total, pure and mixed) was less than for their non-HITH matched groups

If HITH did not exist, these episodes would have been more costly to treat as in-hospital episodes of care (assuming that the LOS for treatment was the same (or similar) for those individual patients). Based on these findings, **we recommend** that *DHS promote the integration of Hospital in the Home, as a cost-effective alternative to ward-based care, in acute hospitals across Victoria*



Taking HITH Differences into Account

HITH is particularly cost-effective as a form of total episode substitution. The fact that matched eligible patients were available in the non-HITH group suggests that there is likely to be potential for greater use of pure HITH.

Length of stay was found to be the strongest predictor of cost in the HITH component of care.

The patient mix, treatments, costs and length of stay in pure HITH and mixed HITH are very different. The pure HITH group is less complex and less likely to be severely ill.

The total episode cost of mixed HITH was greater than that of the matched non-HITH episodes when examined in an unadjusted cost-modelling exercise.

This is because length of stay for the in-hospital ward component in mixed HITH was significantly longer than in non-HITH episodes, including a higher proportion of patients who stay longer than the State average.

Eligibility for Transfer to Mixed HITH

An analysis of the timing of transfer to mixed HITH found that, at several sites, there may be potential to transfer the patient to HITH earlier in the stay. Given the lower daily cost of HITH this has the possibility to further reduce the total episode cost.

The mean LOS was longer for the mixed HITH group (13.7 days) compared with the matched non-HITH sample (5.4 days).

The mean number of days in HITH for the mixed HITH group was only 5 days. Analysis showed that there was a longer LOS in hospital for the mixed HITH sample prior to transfer into HITH in comparison with the matched non-HITH sample.

The criteria utilised for the identification and selection of patients eligible for mixed HITH was not the same across all conditions requiring treatment.

We recommend that *patients who are eligible for mixed HITH (partial episode substitution), should be identified, transferred into HITH and discharged as early as possible, in order to optimise cost-effectiveness. Clinical practice guidelines and acuity measures could facilitate this.*

HITH Nursing and Medical Costs

Ward level (nursing) and medical costs account for the largest proportion of the total episode cost in both HITH and non-HITH. Differences in these cost components account for the largest cost differences between HITH and non-HITH episodes of care.

HITH is associated with reduced ward level costs medical costs

Sensitivity analysis to examine the effects of systematic variation in these cost components upon the cost differences between HITH and non-HITH episodes was undertaken.



This revealed that reducing the ward level costs has the greatest impact on reducing the cost difference in favour of HITH. However, this effect was less marked at sites where manual costing methods were used.

At all sites HITH had a lower unit cost. This should be expected, as the care provided in HITH is less labour intensive. HITH provides less direct nurse contact than in the ward, and so is provided to patients who require less direct nursing care.

This type of care should be less costly to provide. The sensitivity analysis showed that the unit cost of HITH was comparable to the lowest level of nursing dependency in the ward, or that its proportionate cost was relative to the lower nursing dependency provided, compared to the average in the in-hospital wards at that site.

In pure HITH episodes, subcontracting of nursing services was associated with lower costs. It was not clear whether these cost savings were associated with subcontracting nursing visits for the whole episode or just after-hours care.

“At all sites HITH had a lower unit cost”

It was not within the scope of the study, however, to ascertain whether these lower costs were sustainable and reflected true costs, or alternatively were due to subsidisation from other funding sources.

Implications of Changes in HITH Utilisation Patterns

Changes in patterns of HITH utilisation will have implications for the complexity and cost of HITH and non-HITH episodes of care. Where less complex cases are diverted from an in-hospital ward to HITH care, for example, total episode cost of care will decrease for that case.

To the extent this does take place, however, the corresponding tendency will be for an increase in the complexity of cases managed in the in-hospital wards.

This will simultaneously reduce unit costs in HITH and increase unit costs for in-hospital ward care. Similarly, increased throughput in HITH will also reduce unit costs, assuming that capacity in HITH is not exhausted.

We recommend the development of standardised Victorian guidelines for common treatments provided in HITH.

Validation of Cost Results

Validation and sensitivity analysis of both the costing methods and the unadjusted cost comparison study results was undertaken. The HITH cost was comparable to the cheapest level of ward care in the unadjusted model, and differences in cost attributable to between-ward differences (boarder effect) did not affect costs in this study. HITH LOS was appropriate for use in the modelled HITH cost comparison exercise. Analyses indicate that cost shifting was unlikely to have any significant effect.

1.5.2.2 Adjusted Costs of HITH Compared with non-HITH

Simple and multiple linear regression analysis were performed using SPSS ⁶³ to estimate univariate and adjusted cost ratios of various types of care. The outcome variable was logarithm of cost, because of the skewed distribution of cost. Stepwise regression was done to identify models that best described the variance in the cost.

After adjustment was made for relevant clinical predictors, pure HITH episodes were 38% cheaper than non-HITH ($p < 0.001$). The adjusted cost of mixed HITH episodes was not significantly different to that of non-HITH.

Given that the mixture of pure HITH and mixed HITH episodes in this study was 54% versus 46%, the cost of episodes of acute care containing a HITH component overall were significantly less expensive than non-HITH by 9% ($p = 0.04$).

Based on the unadjusted and adjusted cost findings, we recommend that DHS promote the integration of HITH, as a cost-effective alternative to ward-based care, in acute hospitals across Victoria.

Predictors of Total Cost (HITH and non-HITH)

Variables including HITH, long length of stay (LOS) and chemotherapy explained 60% variation in total episode cost (TEC). Length of stay was the strongest and most significant predictor of cost. The most important clinical predictors of total episode cost were long LOS (which predicted higher cost) and chemotherapy (which predicted lower cost).

E-codes (injury codes) also predicted cost, suggesting that injury was associated with higher episode costs. Stay in an intensive care unit (ICU) or a high dependency unit (HDU) also predicted cost, probably because they reflect sicker patients who required greater resources.

The number of diagnoses and procedures also predicted cost, probably because they are markers of clinical complexity of cases. Cardiovascular disease was also associated with higher cost.

Variables that did **not** significantly explain the variation in TEC included age, death, respiratory disease, diabetes and rural location.

Cost of HITH Episodes

The mean cost of pure HITH episodes was 22% lower compared to mixed HITH for total HITH cost ($p = .004$).

The adjusted cost analysis confirmed that HITH episodes overall were significantly cheaper than non-HITH.



Predictors of Cost of HITH Episodes

Length of stay was the strongest predictor of TEC and HITH cost in HITH. Types of treatment that predicted higher HITH cost were antibiotic therapy and wound management. Types of diseases that predicted higher cost in HITH were cardiovascular and respiratory diseases.

The variables pure HITH, long LOS in HITH, E-codes, blood tests, antibiotic treatment, wound management, high number of diagnoses, death, cardiovascular disease and respiratory disease explained 28% variation in total HITH cost.

The variables which did **not** significantly explain the variation in total HITH cost included age, diabetes, readmission, anticoagulation, chemotherapy, high number of procedures and rural location.

The Service Delivery Models of HITH Predicted Cost

Service delivery models were characterised as either a hospital, GP or mixed service model of care on the basis of who was responsible for medical management of HITH patients.⁶

In the hospital service model, the hospital delivered all care. In the GP service model, the general practitioner was subcontracted and paid by the hospital to manage the patient's care and utilised the services of the hospital (nursing care, allied health, pathology, and radiology) to assist with care delivery. In the mixed service model, the hospital and GP allocated and shared medical responsibility based on particular circumstances such as degree of medical intervention.

Mixed service model
cost 24% less
compared to other
models

In this study, the hospital service model applied to 17 (49%) programs and 508 (52%) of matched episodes; the GP model applied to 5 (14%) programs and 52 (5%) of matched episodes; and the mixed model applied to 13 (37%) programs and 417 (43%) of matched episodes.

The GP service model was 88% more expensive compared to other service models ($p<.001$). However, the GP service model sample size was small and drawn from a small number of hospitals. For pure HITH episodes, the mixed service model cost 24% less compared to other service models ($p=0.02$). In the mixed service model of HITH, subcontracting nursing services was associated with lower costs.



1.5.3 Cost of Conditions Managed in HITH

Depending upon the diagnosis, level of complications and discharge status, a person is assigned a DRG. An average cost for health care provision can then be calculated for all those assigned a DRG.

The purpose of this type of classification system is:

- to provide an information system to enable comparisons to be made across the hospital system
- to act as a system of funding hospitals for health care provision

To aid analysis of conditions and treatments in HITH, 13 groups were formed from the more commonly occurring DRGs, as shown in Table 1, p13.

Unadjusted Costs

HITH (pure and mixed) was significantly cheaper than non-HITH for chemotherapy ($p < .001$) treatment of DVT ($p = .006$) and respiratory disease ($p = .004$). For DVT and respiratory conditions, cost savings were mainly in nursing services. In addition, imaging (averaging \$500), pathology (averaging \$200) and pharmacy (averaging \$200) contributed to cost savings, with total cost savings ranging from \$500 to \$2000.

HITH care for complex neonatal care ($p = .028$), post operative management following hepato-biliary surgery, complex malignant skin conditions ($p = .025$) and gynaecological procedures ($p < .001$) was more expensive than matched non-HITH episodes of care in the sample. This was due to the longer length of in-hospital ward stay before transfer to HITH; average daily cost of care was cheaper in HITH compared to non-HITH for these conditions.

Total episode costs for obstetrics, ENT and cardiac surgery DRGs are likely to be equivalent in HITH and non-HITH. Further statistical analysis of these DRG groups showed that they did not differ significantly in cost.

Cost Effective Care in HITH

Pure HITH episodes are consistently less costly across all of the condition groups identified. Respiratory conditions, DVT, cellulitis and other non-malignant skin conditions, day chemotherapy, and kidney and urinary tract infections have much lower TEC's when treated as pure HITH episodes in comparison with non-HITH.

The mixed HITH sample showed greater variability in cost differences by condition in comparison with non-HITH. Respiratory conditions, DVT, and cardiac medical conditions are less costly for the mixed HITH episodes than matched non-HITH episodes.

The modelled non-HITH episodes were the most costly for all groups of conditions except DVT and kidney & urinary tract infections. This relates to the higher marginal cost of non-HITH compared with HITH and the longer LOS in mixed HITH compared with non-HITH. These two factors account for the greater TEC of modelled HITH compared with the total (pure and mixed) HITH sample.



Comparison of total episode costs by condition group between the pure HITH, mixed HITH and modelled non-HITH samples shows that:

Pure HITH episodes were consistently less costly across all of the condition groups identified

DVT, respiratory conditions, cellulitis and other non-malignant skin conditions, day chemotherapy, and kidney and urinary tract infections had much lower costs when treated as pure HITH episodes

DVT, respiratory, and cardiac medical conditions are also less costly for the mixed HITH episodes

The modelled non-HITH episodes were the most costly subset for all groups of conditions except DVT and kidney and urinary tract infections

Adjusted Costs

Costs were higher than average in those episodes associated with long LOS, antibiotic therapy, wound management, cardiovascular and respiratory disease, multiple diagnosis, injury and death.

The high costs of HITH treatment with antibiotics and wound management were likely to be due to the use of expensive new long acting antibiotics and moist wound dressings, which are suitable for use at home. The other predictors were a function of clinical factors rather than HITH itself.

For HITH episodes, variables including pure HITH (decreases cost), long LOS, E-codes, blood tests, antibiotic treatment, wound management, high number of diagnoses, death, cardiovascular disease and respiratory disease explained 28% of the variation in total HITH cost.

Variables which did not significantly explain the variation in total HITH cost included age, diabetes, readmission, anticoagulation, chemotherapy, high number of procedures and rural location.

Component Costs

Nursing was the largest component of cost for pure HITH, mixed HITH and non-HITH patients. For the pure HITH group, surgical and theatre costs varied with the surgical conditions from between 2% to 40% of costs; medical costs ranged from 9% to 42% around a weighted mean of 19%; and pharmacy costs ranged from 1% to 66% around a weighted mean of 11%.



For the mixed HITH and non-HITH patient groups, surgical, theatre and medical costs were the next highest components, with pharmacy having a varying impact on total cost.

Chemotherapy was Cost Efficient

Results suggest that chemotherapy was highly cost efficient based on episode costs. This finding differs from that of other studies.³¹ Chemotherapy was a significant predictor of lower episode cost. However, most patients receiving a whole course of chemotherapy required multiple episodes of care, so that on a per patient-basis, rather than a per episode-basis, chemotherapy may not be cheaper.

This is in contrast to patients who usually require a whole course of therapy in one episode of care. On an episode-based comparison, other treatments (eg antibiotics, anticoagulation) would be more expensive than chemotherapy, but on a patient-based comparison, those differences may disappear or even be reversed.

There are additional factors other than cost, which determine suitability for HITH, including levels of family support, and patient lifestyle and preference. Cancer patients may prefer to receive chemotherapy at work, home or an oncology day centre.

Chemotherapy was cheaper in HITH compared with non-HITH episodes. The sample was predominantly from three home chemotherapy programs. One of these hospitals (which contributed approximately one third of the chemotherapy sample) was unable to supply a validation or description of the cost methodology employed. However, the trend displayed was consistent with the remainder of the sample.

The costing results for chemotherapy showed the savings in HITH occurred predominantly in pharmacy, medical and nursing costs. Lower pharmacy costs were most likely due to differences in drug regimes. Most patients in HITH required 5FU which was suitable for home chemotherapy, while many others in the hospital day ward received more expensive regimes. Savings in infrastructure related costs are likely explanations for the savings in nursing and medical costs.

Before promoting chemotherapy more widely in HITH, it is important to review the evidence and conduct further research to compare the costs and patient acceptability of chemotherapy in HITH and other ambulatory models.

The adoption of standardised guidelines for common treatments provided in HITH could reduce clinical practice variation, promote evidence-based practices and appropriate use of resources, and be the basis for monitoring quality and professional development. Therefore we recommend DHS fund the development of standardised Victorian guidelines for common treatments provided in HITH.



1.5.4 Cost by Location

HITH is not a homogenous entity nor is the environment in which it operates. This study, therefore distinguished between programs in metropolitan and regional Victoria and also differentiated larger centres from smaller centres.

The grouping of all participating hospitals took into account the differences in operations, scale, turnover and location. The 4 groups consisted of:

- Metropolitan 1 - Tertiary and specialist hospitals
- Metropolitan 2 - Secondary and community hospitals
- Rural sites 1 - Larger regional centres
- Rural sites 2 - Smaller rural centres

In response to local needs, each of the hospital groups utilised different service models of HITH. All sites demonstrated two distinct groups of patients ie; pure and mixed HITH groups. Pure HITH episodes targeted the less complex, lower cost and shorter LOS patient (across any condition), while mixed HITH was used for the early transfer home for long stay/ complex episodes.

Mixed HITH at Metropolitan 1 sites was more expensive when compared to mixed HITH in other hospital groups. These sites used the HITH program to treat complex patients and the total HITH episode costs were significantly higher for those episodes. Most of these costs occurred prior to transfer into HITH.

Location was found not to be an independent predictor of cost.

The cost differences between hospital groups reflect the differences in patient mix, the use of HITH, the proportion of total or partial episode substitution and the conditions treated in each group. Location was found not to be an independent predictor of cost.

For pure HITH, Metropolitan 1 had a lower length of stay than all other hospital groups. For mixed HITH, Metropolitan 1 had a higher length of stay than Metropolitan 2 and Rural 2. For non-HITH, Metropolitan 2 had a lower length of stay than Metropolitan 1 and Rural 1.

Pure HITH was less costly at all sites both in a total episode and average daily cost. Respiratory, DVT, hepato-biliary surgical conditions and cellulitis were able to demonstrate cost savings in the use of HITH. These cost savings were achieved in nursing, imaging, pathology, and pharmacy.

1.5.5 Cost by Length of Stay

Several studies indicate that LOS may be affected by: ^{36-39,40 41}

- independent patient factors (such as age and co-morbid conditions)
- procedure related complications
- independent hospital factors (such as staffing and bed numbers)

The HITH Costing study evaluated LOS, the predictors of LOS and the unadjusted and adjusted cost of LOS in HITH for all types of HITH.

Unadjusted Costs for LOS for HITH and non-HITH

In the unadjusted cost analysis, LOS was found to be the strongest predictor of cost in the HITH component of care. Whilst total HITH require a longer LOS (8.1 days) than non-HITH, pure HITH requires a shorter/equivalent LOS (3.2 days) when compared to non-HITH matched pairs (3.9 days). Mixed HITH had a significantly longer LOS (13.7 days) than for non-HITH episode of care (5.4 days).

Length of stay is shorter or the same for pure HITH compared with non-HITH. The total episode LOS for mixed HITH is greater than for its matched in-hospital episode. This is not accounted for by the LOS in HITH. Differences in LOS could reflect important differences in the types of patients selected into mixed HITH versus pure HITH, with the latter group being less complex and less likely to be severely ill.

In-hospital Component of Mixed HITH

Mixed HITH appeared to contain many patients with more complex conditions who exceeded the SALOS

The mixed HITH sample contained a higher proportion of patients who exceeded the “state average length of stay” (SALOS) boundaries, than either its matched non-HITH sample or the pure HITH.

These episodes are considered by the Victorian Case-mix funding system to be “outliers” i.e., outside the “normal” distribution of LOS (and associated resource consumption) for their particular ANDRG3.

A quarter of the mixed HITH sample contained “outlier” episodes, while the proportion of non-HITH and pure HITH “outlier” episodes was only approximately 5%.

The patients in the mixed HITH group appeared to be sicker and more complex than those in pure HITH or non-HITH. Often mixed HITH was used to transfer longer staying and complex patients home for the last part of a long hospital stay.

Mixed HITH has only a small proportion of HITH days as a proportion of total LOS. Less than half of the LOS for mixed HITH were days spent in HITH. The mean days spent in HITH for the mixed HITH group was 5 days.

The tertiary and specialist hospitals (Metro 1) had a small number of HITH days as a total proportion of the total episode of care. This group of metropolitan hospitals differed in its use of transfers to HITH when compared with all other hospital groups. In contrast the LOS for pure HITH was the lowest in this hospital group when compared to other hospital groups.



Moving Patients to Mixed HITH Sooner

Conditions or sites that could potentially make increased use of HITH were sites where LOS fell inside the target range for over 50% of episodes, and also where over 50% of the target days occurred in hospital (refer Figure 1).

These sites potentially have an opportunity to improve timing of transfer to HITH to improve cost-efficient management of these conditions.

This will necessitate developing a strategy which includes the identification of target conditions at individual sites on the basis of the above criteria, an examination of the existing activities of the particular HITH service, and an examination of the training and resource requirements if the particular service is to respond to meet this perceived opportunity.

The majority of the LOS for Mixed-HITH was spent in an in-hospital ward

Discharge from HITH

It is also possible that the individual HITH services need to adopt criteria for discharge from HITH. Ideally these could be a uniform set of criteria for use by HITH services across the state. In this way service audit criteria could be developed to feed into quality assurance programs, and these programs could be developed in such a way as to facilitate comparisons between HITH program sites and conditions. This is a particularly important issue in relation to the issue of per-diem incentive funding and its potential withdrawal.

Predictors of LOS in HITH

We examined two important clinical outcomes, death and LOS, to determine if there were significant differences in these outcomes between HITH and non-HITH. Models were created to examine predictors of death and LOS. In order to adjust for potential confounding factors, multiple logistic regression was performed using Egret.⁶⁴ The entire sample was analysed as there was no significant difference between samples between non-HITH, mixed HITH and pure HITH.

The adjusted LOS model shows that pure HITH was the strongest predictor of a shorter LOS and overall HITH (mixed and pure) was the strongest predictor of a longer LOS.

“Pure HITH was the strongest predictor of a shorter length of stay”

However the long LOS for overall HITH was accounted for by the non-HITH component of mixed HITH episodes.

The differences in LOS could reflect important differences in the types of patients selected into mixed HITH versus pure HITH, with the former group containing more complex and severe conditions.

Other predictors of long LOS in the adjusted model such as death, stay in ICU or HDU, high number of diagnoses, high number of procedures and older age are probably markers of increased clinical complexity of cases.



Diseases and treatments which predicted long LOS were diabetes, E-codes (injury), anti-coagulation and wound management. A knowledge of which conditions and treatments predict longer LOS is useful in planning an efficient HITH program.

We recommend hospital practice *take into account the differences between HITH service provision as pure HITH (total episode substitution) and mixed HITH (partial episode substitution) when planning HITH service development.*

Limitations of LOS Measurement

LOS may not necessarily be a relevant outcome measure outside the in-hospital setting. The various funding systems impose the use of LOS as a performance measure. Outside of the institutional environment, this may not be an appropriate unit to measure the severity of the patient condition, the quality of the service or outcome,.

The strong correlation between LOS and cost helped to justify bed-day based cost methodology. There is still potential for the introduction of a nursing dependency system which might allow for the examination of the distribution of ward level costs by day of stay across length of stay, whether provided in HITH or as non-HITH care.



1.5.6 Attitudes & Opinions

Focus Group Findings in Relation to Decision to Use HITH

There were several very clear indications to emerge from this study:

1. HITH is accepted and favourably regarded by those who took part.
2. There was a strong belief that HITH patients are very satisfied with their involvement in the program and a number of patient surveys conducted by the hospitals were cited as evidence of this. The predominant reasons given were the advantages of being in the home environment - around family, their dignity restored, etc, and of not being in hospital and at risk of cross-infection or bothered by noise and food that was not to their liking. The only negative cited from a patient viewpoint was that some patients, initially at least, felt apprehensive about being treated in their home.
3. The number and diversity of HITH models which exist in the hospitals surveyed suggests that there are many other variations in the other hospitals utilizing HITH across the state.
4. There was consistency across participants in the factors which determine patient eligibility - the type and severity of the illness, and the suitability of the home environment being the main ones. For clinicians the type and severity of the illness was the key to whether or not they refer to HITH.
5. One consistently mentioned barrier to participation in HITH was the fact that people with private health cover are not eligible to be part of this program.
6. There was a virtually unanimous belief that HITH is significantly cheaper than in-hospital care, based largely on the rationale that a patient at home does not need food and other "hotel" services. There was also some scepticism about the validity of a previous report which concluded that HITH and in-hospital costs were about the same.
7. Clinicians rarely, if ever, consider costs when making a decision whether or not to refer to HITH.
8. Concerns about the relationship of HITH and WIES funding were raised. The perception was that there are several implications of this - that HITH incentive payments are not as important as the level of WIES; that capped WIES levels are restrictive, and that there is little point in achieving productivity savings through HITH because WIES funding levels mean that the resulting increased activity levels will not be funded.
9. There was complete faith in the viability of HITH, now and in the future from the viewpoint of HITH coordinators and clinicians. There was some incredulity that the issue of viability could even be considered. Given this, the one factor that was felt to be crucial was funding, both for existing levels of HITH activity and for the future.
10. The future of HITH was for it to become a seamless part of the hospital and community system of health care. This view was also felt to be in line with government expectations.
11. Participants felt that it was likely HITH would expand in the future, as advances in processes, technologies and drugs continue to make more conditions suitable for treatment at home.
12. The role of the individual HITH coordinators has been of significant importance to the overall success of the program in their hospital thus far. The impression was that the energy, commitment and enthusiasm of the HITH coordinators was the single most important catalyst in moving hospital administrations towards embracing HITH.



1.5.7 Limitations of Study

This study is subject to certain caveats. Lack of or inconsistent levels of detailed activity data limited costing sensitivity in this study. The cost methods varied between hospitals and between different products within hospitals. A total of nine cost methods were identified and defined. Costs of emergency services were not uniformly collected or identified from manually costed hospitals. Montalto (1998) highlighted the difficulty involved in accurately measuring emergency costs in any context.²⁶

The allocation of products to a patient episode could usually be linked to actual utilisation from that department but it could not always be precisely measured. Due to lack of data on actual utilisation, on occasions the consumption of products by a patient episode had to be assumed from other utilisation or attributes of the patient episode. In addition, data submitted from a few hospitals were unable to be properly validated, due to time constraints and lack of alternative data.

Jackson et al (1999) have drawn attention to the need for users of cross-hospital cost data to have a good understanding of source data issues in order to make valid comparisons.⁴² Without accurate and consistent costing data, it is difficult to compare innovative new services with standard hospital care. In addition, cost comparisons are difficult between hospitals and within hospitals due to the lack of consistent, detailed activity data, limited costing sensitivity and the variation on costing methods between hospitals and between different products within hospitals.

In this study, cost comparisons between HITH and non-HITH episodes were valid for each hospital site, as the relevant cost components had the same or similar costing assumptions attached. The use of average costs gained consistency and comparability at a hospital site at the expense of sensitivity. Also, the comparison of episode costs across many episodes and hospitals enabled the larger cost trends to emerge.

The crude costs are useful for describing overall trends, but are not as robust as adjusted costs because of limitations of matching. The matching process attempted to match similar patients with similar diseases and treatments, but this process was not perfect. For example, functional status could be a relevant indicator of patient condition, however, this information was not available in the review of medical records.

Matching, therefore, did not completely eliminate the effects of confounding. This limitation was overcome by two methods. Firstly, adjusted costs of HITH and non-HITH were compared using statistical techniques to eliminate the effect of confounders. Secondly, the hypothetical cost of care for HITH patients was modelled, had they received the same care in hospital.

Accurate costing data as well as patient outcomes data may be important drivers of the configuration of services by type and volume, which are provided at a particular location. In order to facilitate this, it will be important to develop standard costing methodologies for use at all hospitals.



Therefore, we recommend that DHS develop and promote standard costing methodologies so that HITH can be compared between hospitals and with other services. This could be referred to a suitable body, such as the Victorian Clinical Costing Standards Committee to develop standards for activity based costing of HITH.

Nursing costs are the main service cost component of HITH and non-HITH episodes. Nursing costs at an activity level are not well understood or documented, and so comparisons within hospitals by day of stay, between hospitals, and between hospital and community-based services are difficult. Accurate measurement of nursing activity will be necessary if accurate allocation of ward level costs by day of stay across length of stay is to be a feature of activity based costing, whether for in-hospital ward or HITH episodes of care.⁴³ Previous attempts to cost nursing activity have been sporadic and of limited validity.^{26 44 45}

As many of these methodological issues apply to both the HITH and non-HITH samples, our outcome of interest, the difference in cost, should still be valid.

1.5.8 HITH and Existing Casemix Funding

Predictors of cost

Chemotherapy, and the treatment of cellulitis and respiratory conditions were significantly cheaper to provide in HITH episodes.

HITH episodes were significantly more expensive for treatment of neonates, malignant skin conditions and gynaecological disorders.

This was due to the longer in-hospital ward LOS before transfer to HITH. HITH episodes for the treatment of other conditions were cost neutral.

These findings show HITH was cheaper or cost neutral compared with in-hospital ward care, on an episode or per day basis, for all conditions.

The transfer of patients to HITH earlier in the in-hospital stay has the potential to reduce episode cost

An analysis of the timing of transfer to HITH found that several programs still had opportunities to transfer the patient to HITH earlier in the stay. Given the lower daily cost of HITH, this has the potential to further reduce the TEC for many conditions.

Therefore, we recommend patients who are eligible for mixed HITH (partial episode substitution), should be identified, transferred into HITH and discharged as early as possible, in order to optimise cost effectiveness. Clinical practice guidelines and acuity measures could facilitate this.



Cost Effective Care

The economic analysis identified opportunities within casemix funding for cost minimization in mixed HITH episodes. Figure 1 displays the revenue stream for conditions across days of stay within casemix funding.

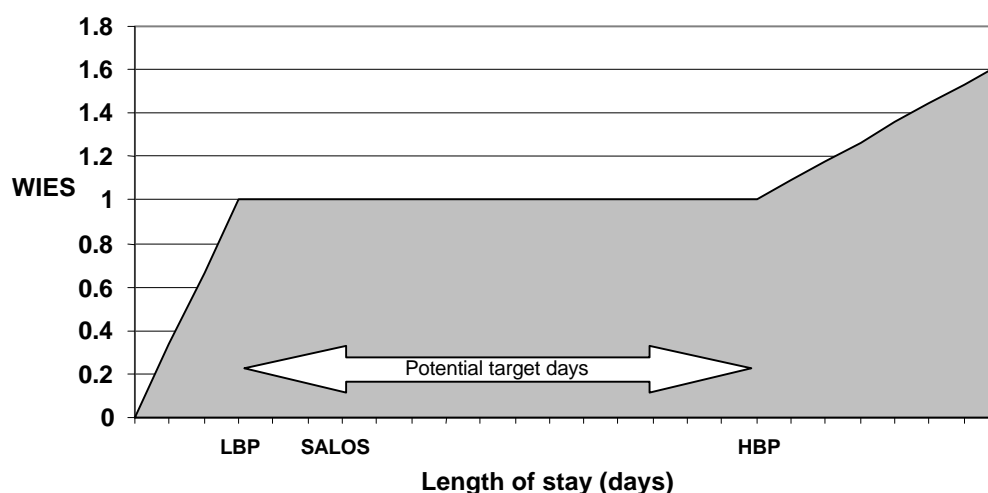
Given that episode costs show a strong correlation with LOS, casemix funding does not follow the same pattern inside the two LOS boundaries.

Therefore, there is an area of potential target days between the low boundary point (LBP) and the high boundary point (HBP).

Clinicians could potentially target episodes with expected long LOS for earlier transfer to HITH to maximise the effective use of financial resources in a casemix funding framework.

There is potential for earlier transfer of patients to HITH, to pursue more cost effective management of 'target days' of episodes, for hepato-biliary surgery, complex cellulitis, malignant skin conditions, gynaecological, neonatal, vascular, bowel & abdominal surgery, digestive malignancy, septicemia and burns.

Figure1 Potential for Early HITH Intervention During Inlier Period to Achieve Cost Savings



It is also possible that the individual HITH services need to adopt criteria for discharge from HITH. Ideally these could be a uniform set of criteria for use by HITH services across the state.

In this way service audit criteria could be developed to feed into quality assurance programs, and these programs could be developed in such a way as to facilitate comparisons between HITH program sites.

This is a particularly important issue in relation to the issue of per-diem incentive funding and its potential withdrawal.



Incentive Funding

While the per diem incentive payment may have assisted the establishment of HITH, this study indicates that it is not required to fund HITH compared with in-hospital ward care under casemix funding in Victoria at present.

To ensure that effectiveness rather than politics drives good resource management, it may be appropriate for hospitals to identify WIES targets (within a capped WIES environment) for the HITH program.

However, findings of qualitative research with referring clinicians and hospital finance managers indicated that capped WIES funding might be a barrier to the use of HITH. The quarantining of HITH WIES may be an incentive for hospitals to use and expand HITH as an integral part of bed management.

We therefore recommend that DHS continue to fund HITH services through casemix funding for all conditions and provide funding to support key activities of HITH in Victorian hospitals. This may include medical and nursing leadership, coordination of services, training and education, and administrative support.

1.5.9 Future Viability

Qualitative research clearly identified the skills and personal attributes of the HITH program coordinator as a driver of the quality of Hospital in the Home. It is important to recognise that HITH, as it has been developed in Victoria, is a mode of delivery of acute care (as distinct from community nursing).

As such, there needs to be an investment in appropriate ongoing training of HITH staff if Hospital in the Home programs are to become more widely accepted and be flexible enough to respond to new opportunities due to innovations in modes of drug delivery and technology.

The qualitative research within this study confirmed previous reports that clinician confidence plus patient choice and satisfaction with HITH has facilitated its widespread adoption.

It is important that hospitals promote medical leadership to encourage clinician ownership of the medical management of HITH patients.

This study did not examine costs to the patient and carer.

Further costing studies are required to assess whether cost savings represent cost shifting to patients and carers, and to assess consumers' views on costs and their acceptability and influence on the future viability of HITH.

We recommend that further research be undertaken to identify costs and their impact on consumers and carers, associated with HITH as compared with in-hospital ward care.



It should be remembered that changes in patterns of utilisation of HITH which divert the less complex (and therefore less expensive) cases from the in-hospital ward to HITH will result in a corresponding increase in complexity (and therefore expense) of cases managed in the in-hospital ward.

This will simultaneously reduce unit costs in HITH and increase unit costs for in-hospital ward care. Similarly, increased throughput in HITH will also reduce the marginal costs, assuming that capacity in HITH is not exhausted.

It is likely in the future that HITH will become more cost-efficient and will gain wider acceptance as a mode of delivery of acute care.

In addition, more sophisticated models of HITH may develop with increasing experience of HITH programs, with different models evolving for HITH as total episode substitution and partial episode substitution.

Future investment in new, less invasive technologies that reduce the need for management in hospital will increase the range of conditions suitable for treatment in HITH.

We recommend *that DHS fund new initiatives to build capacity which may include guideline development, collection of a minimum data set, and the identification of new conditions and settings suitable for HITH.*

Because HITH is an innovative program funding source there is potential for HITH to be used for patients who could be more appropriately managed in other ways. We identified cases in this study where HITH did not appear to substitute for acute care (eg post-discharge phone call, long LOS for post-acute care).

Other examples have also been identified in the DHS Hospital in the Home 1997/98 Service Audit Final Report.¹⁶ There is, therefore, a need to monitor acuity and eligibility for HITH.

Standard eligibility criteria for HITH services are necessary to ensure that HITH is used as an appropriate substitution for acute inpatient episodes of care. This will assist also in establishing criteria for comparisons in HITH service performance between hospitals.

We recommend *acuity measures be developed to monitor eligibility for HITH.*

In future, it is likely that the treatment of some conditions could be transferred from in-hospital ward to pure HITH, while others could be transferred from HITH to the community sector.

For instance, some acute conditions currently treated in pure HITH, such as DVT and cellulitis, could be managed by general practitioners without requiring a hospital admission. Other forms of ambulatory care such as day treatment centres, post-acute care and community nursing may also play an important role in the shift of acute care from the hospital setting.

Casemix funding can support transfer of conditions from hospital into HITH. However, other funding arrangements are needed to support transfer of conditions from HITH to the community sector.



A more integrated approach to acute care is necessary if we are to achieve seamless care with the most appropriate transition of patients between hospital and community-based care. This may require the DHS to review the interplay between access criteria and availability of HITH with the other sources of funding of acute care substitution (casemix, VACS and Medicare).

We therefore recommend a review of the causes of inappropriate use of HITH (and hospitalisation), such as limited availability of more appropriate non-acute community services, in order to achieve the optimal mix and responsiveness of services to meet patients' needs and prevent hospitalisation.

Adopting Appropriate Criteria for Hospital in the Home

Length of stay is the strongest predictor of cost of the HITH component of care. Therefore it is important to use standardised criteria to monitor patient admission and discharge from HITH. Criteria may vary according to the condition requiring treatment.

This study was not designed to evaluate the appropriateness of LOS for specific conditions. However, there is no evidence in this study that HITH care per se, or the associated per diem incentive payment, resulted in a longer LOS. This finding is different from other studies, which did not adjust for confounding factors.

Length of stay may not be a relevant outcome measure outside the in-hospital ward setting. The casemix funding system imposes the use of LOS as a performance measure.

This may not be an appropriate unit to measure the severity of the patient condition, the quality of the service or outcome, outside of the institutional environment.

The adoption of standardised guidelines for common treatments provided in HITH could reduce clinical practice variation, promote evidence-based practices and appropriate use of resources, and be the basis for monitoring quality and professional development.

Therefore we recommend DHS fund the development of standardised Victorian guidelines for common treatments provided in HITH.

To assist the integration of HITH within hospitals, we recommend that DHS provide funding to collect a HITH minimum data set to address transparent accountability in relation to hospitals' business management and quality improvement.

Some private patients who currently occupy beds in public hospitals, could be treated more equitably and cost-effectively in HITH.

The policy issues raised concerns by the referring clinicians that privately insured persons are systematically excluded from HITH programs (unless they forego private patient status for the episode) should be explored further.

We recommend *that DHS explore options for treating private patients in HITH.*

1.6 Conclusions

Hospital in the Home is a safe, acceptable and cost-effective alternative to acute in-hospital care for a wide range of clinical conditions.

The HITH cost comparison demonstrates that overall the HITH program can be delivered within the existing casemix funding system.

The appropriate use of HITH needs to be viewed from the clinical decision-making perspective. Access to HITH as a total episode substitution (pure HITH) is determined at the point where a decision is made to admit the patient to hospital. In comparison, access to HITH as a partial episode substitution (mixed HITH) is determined at the point where a decision is made to transfer a patient home from an in-hospital episode of care. These are fundamentally different considerations. Monitoring eligibility and acuity criteria, ensuring early notification and transfer, and coordinated access to other services can ensure appropriate use of HITH.

Based on the costs, outcomes and a qualitative examination of factors affecting the clinician's decision to use HITH, we have made seventeen recommendations to facilitate the future development and viability of Hospital in the Home.



1.7 Glossary

Terms adapted from Draft VCACI Standards for Hospital in the Home

Carer	A person such as a family member, friend, or neighbour who provides care and assistance during the HITH episode of care.
Community service provider	Health care and supportive services available in the patient's local community, for example, general practitioners, district nursing, community health centres, and local government services.
Episode of care (Acute)	A period of acute inpatient care provision which is defined by admission to and separation from hospital, including the HITH component.
Home	For brevity, the term 'home' is used throughout this document. In the context of HITH care, the term home is intended to be applicable to any place of residence in which HITH care is provided.
Hospital in the home (HITH)	The provision of acute care in the home which involves: treatment of patients with acute conditions who would otherwise have required treatment in a hospital bed, provision of the level and type of services that would normally be provided in a hospital bed, provision of those services within the home, and provision of an appropriate level of emergency back up (KPMG). ⁶
HITH episode of care	A period of acute care provision in the home, where the patient is deemed an inpatient of the hospital, defined by admission/transfer to and separation/transfer from HITH.
Includes	A list that provides examples and is not limiting (ACHS). ²
Length of stay	A calculation providing the number of days a patient has been admitted to hospital. This calculation can be divided into both the inpatient and HITH components of care.
Medical record	Compilation of pertinent facts of a patient's health and life history, including past and present needs and interventions, written by team members contributing to the care and treatment of the patient. Synonyms include unit record, health record or patient record (ACHS). ²
Patient	A person for whom a hospital accepts responsibility for treatment and/or care. HITH patients are considered admitted patients (ACHS). ²
Policy	Documented statement that describes the organisational guidelines to inform decision making.

Procedure	A set of documented instructions conveying the approved and recommended steps for a particular act or sequence of acts (ACHS). ²
Responsibility	The obligation that a person assumes when undertaking to carry out delegated functions. The person who authorises the delegated function retains accountability (ACCNS). ⁵
Separation	The process by which an admitted patient completes an episode of care (AIHW). ⁸
Staff	Term which includes employed, visiting sessional, contracted or volunteer personnel (ACHS). ²
Standard	The required level of quality or proficiency of a service or component thereof.

Source documents

ACCNS	Australian Council of Community Nursing Services (1997) (2 nd Ed) <i>Standards for community nursing practice</i> . Melbourne: ACCNS Inc.
ACHS	Australian Council on Healthcare Standards (1996) <i>The EQUiP guide: standards and guidelines for the ACHS evaluation and quality improvement program</i> . Sydney: ACHS.
AIHW	Australian Institute of Health & Welfare (1999) <i>National Health Data Dictionary Version 8</i> . Canberra: AIHW.
KPMG	KPMG Management Consulting (1996) <i>Hospital in the home evaluation part 1: summary report</i> . Melbourne: Department of Human Services.

DEFINITIONS specific to this report:

Casemix related terms	<p>ANDRG – Australian National Diagnosis Related Groups</p> <p>Casemix – An information tool involving the use of scientific methods to build and make use of classifications of patient care episodes. In popular usage, the mix of types of patients treated by a hospital or other health care facility.¹⁰</p> <p>High Boundary point – trim point threshold for high outliers</p> <p>Inlier – range of LOS for a DRG that is considered normal or usual (calculated from inside 2 standard deviations of a trimmed sample)</p>
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Costing terms

Low Boundary point – trim point threshold for low outliers

Outlier – range of LOS outside that of the inlier LOS.

State Average LOS – SALOS – the average length of stay by DRG. This relates to the current average for Victorian inpatients. An annual study of all Victorian inpatient activity is conducted to calculate the Inlier and Outlier LOS for each DRG.

VIMD - Victorian Inpatient Minimum Dataset

WIES – Weighted Inlier Equivalent Separation – A unit of funding used in Victorian public health care that is allocated according to output in patient episodes by a health care institution. This system applies weights by DRG category and acuity (per LOS), in an attempt to match funding to resource consumption (cost).

Activity Based Costing (ABC) - a technique of costing that attempts to value an item based on the costs of its inputs. The item valued can be a product or a service. This method of costing is best suited to products or services that are discreetly identifiable, and standard or predictable in their consumption of resources. The inputs or resources consumed in the creation of this “product” can have measurable or assumed amounts of input, and thus the “costs” of these can be real or derived.

CMIDS – Case-mix Information Delivery Service: a subordinate version of TransitionTM packaged for the smaller hospital sites that do not have the full information infrastructure required to properly run TransitionTM costing.

Clinical Costing - Applies the costing techniques of ABC and JOC to a health environment by using these methods to cost the unit of a patient episode.

Component costs – (or service costs) A grouping of product costs, which relate to the unit costs of particular service types.

Department – An identifiable unit from within the hospital organisational structure. This is usually the same as the hospital’s operational reporting structure (ie cost centres), or a consolidation of like cost centres.

Job Order Costing (JOC) - is a method of costing unique products. The cost is simply determined as the sum of the inputs consumed.

Intermediate Products – The term used in clinical costing to describe the units of product or service produced or consumed in the care of patients, by the various departments of a hospital.

TransitionTM - a clinical costing system that uses ABC to determine unit costs for the services and products of the various hospital clinical departments, (which are referred to as “intermediate products”. TransitionTM then uses JOC to allocate the relevant units to determine the cost of a patient episode.

Database fields

Length of stay (LOS) – Length in days, of a patient episode. This measure is used to measure performance, clinical outcome, and is also used to determine casemix funding.

Treatment –For the purposes of the matching procedure used for this study, the type, purpose and mode of treatment given for a particular condition whilst in HITH, was a major factor for consideration of the appropriateness of a match of two episodes. The treatments had to be equivalent, of same or similar drug or consumable, even if the delivery mode, or packaging enabled variations in treatment delivery (ie suitable for once or twice daily administration, or off campus). This judgment was made with regard to the planned outcome of the treatment.

Diagnosis - The process of determining the nature of the disorder by considering the patient’s signs and symptoms, medical background, and when necessary – results of laboratory tests and xray examinations.¹¹

For the purposes of the matching procedure used for this study, regard was given to the principal and secondary diagnoses coded to the episodes (Per ICD9 diagnosis coding). While a match of principal and secondary diagnosis was a prerequisite for matching criteria, a match of the nature and purpose of the treatment provided in HITH and the relationship between the diagnoses and the particular treatment given in HITH, was the dominant criteria to match two episodes.

Procedure – A therapeutic intervention. This field in the VIMD relates to the ICD9 coded surgical and other, invasive and non-invasive procedures performed during a patient episode.

DRG

Diagnosis Related Groups. A casemix classification system developed in the early 1970s to categorise acute inpatient episodes.

Episode

The phase of treatment that starts with admission to acute care and ends with discharge from acute care.

HITH related terms

Non-HITH – pertains to episode of care, which takes place while the patient is accommodated within the traditional hospital setting.

Pure HITH (TES Total episode substitution) – pertains to an episode of care in which the patient remains accommodated outside the hospital setting for the entire length of stay (ie. the patient is admitted and discharged from the HITH ‘ward’).

Matched non-HITH – a non-HITH episode of care which has been matched to a HITH episode according to the criteria set out in Appendix 1.

Mixed HITH (PES Partial episode substitution) – pertains to an episode of care in which the patient is accommodated outside the hospital setting for a portion of the length of stay.



Modelled non-HITH – A hypothetical episode of care modelled from an actual HITH episode that has assumed they received the same treatment in the same hospital, but on an in-hospital basis rather than in HITH.

ICD9

International Classification of Diseases, 9th revision. The 9th version of the international standard classification of diagnoses and procedures, which is maintained by the World Health Organisation.

In-Hospital

Inside the hospital institution (as opposed to off campus).

Inpatient

A patient that has been admitted to a hospital.

MDC

Major Diagnostic Categories

Models of HITH service delivery

Hospital service model - The hospital remains committed to maintaining a link and a responsibility to the patient. All provisions – medical and nursing care, allied health, pathology, radiology and community support programs – are available to the patient. Contracting of such provisions is also available in this model. Contracting usually involves the out-sourcing of nursing to an external district service such as the Royal Nursing District Service⁵
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GP service model - The general practitioner remains committed to maintaining an outside link and a responsibility to the patient. The general practitioner monitors the patient's progress and utilises the services of the hospital - nursing care, allied health, pathology and radiology – to assist with this delivery of care. General practitioners are contracted to the hospital for payment of services.⁶

Mixed service model - The hospital and general practitioner allocate and share medical responsibility based on particular circumstances such as degree of medical intervention. Services of the wider community as well as the hospital – nursing care, allied health, pathology, and radiology - are available to this model.⁶

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Acknowledgments

Project management

Assoc Prof Don Campbell (Chair)

Dr Denise Ruth

Dr Raina MacIntyre

Authorship of report

Dr Raina MacIntyre

Dr Denise Ruth

Assoc Prof Don Campbell

Ms Alison Yum

Mr Craig Williams

Mr Jason Wasiak

Dr Zahid Ansari

Mr Ross Harrison

NWH Consortium

Dr Raina MacIntyre

Dr Denise Ruth

Assoc Prof Don Campbell

Dr Peter Greenberg

Ms Alison Yum

Ms Joanne Moss

Ms Leonie Segal

Project coordinator & clinical costing

Ms Alison Yum

Research assistants

Mr Jason Wasiak

Mr Craig Williams



VIMD data extraction, data manipulation and computerised matching

Mr Eugene Chandraraj, Research & Development Section, Health Intelligence and Disease Control, Public Health and Development, Department of Human Services

Administrative support

Mrs Wendy Lemaire

Consultants

Mr Ross Harrison (Qualitative research)

Ms Jill Nosworthy (General collaboration and input from the North Western Health HITH Sustainability Study)

Mr Philip Cooper (Report formatting)

Ms Leonie Segal (Economic review)

Dr Zahid Ansari (Adjusted costs)

Ms Rebecca Bartel (Report writing)

Advisory Committee

Assoc Prof Don Campbell, Clinical Epidemiology & Health Services Evaluation, Royal Melbourne Hospital

Ms Alison Yum, Clinical Epidemiology & Health Services Evaluation, Royal Melbourne Hospital (Minutes)

Ms Vivien Adler, Quality Branch, Acute Health, Department of Human Services

Dr Zahid Ansari, Research & Development Section, Health Intelligence and Disease Control, Public Health and Development, Department of Human Services

Ms Susan Daly, Victorian Centre for Ambulatory Care and Innovation (VCACI)

Dr Lindsay Grayson, Department of Microbiology, Monash Medical Centre

Dr Peter Greenberg, General Medical Services, RMH

Dr Amjad Hussain, Broadmeadows Health Service

Dr Michael Montalto, HITH, Frankston Hospital

Ms Leonie Segal, Centre for Health Program Evaluation

Ms Kate Silburn, Health Issues Centre

Mr Amos Yee, Quality Branch, Acute Health, Department of Human Services

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Professor Graham Brown, University of Melbourne

Dr William Hart, Health Intelligence and Disease Control, Public Health and Development, Department of Human Services

Mr Daniel Wong, Department of Human Services

Mr George Fedyszyn, NWH

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Ms Anna De Florio, HITH, Royal Melbourne Hospital

Mr Elwyn Davies, HITH, Western Hospital

Mr Greg Morley, ACT HITH Service, The Canberra Hospital

Mr Simon Rush, Allegience Systems (for costing and cost extracts from CMIDs user sites).

Ms Carol Staley, VCACI



THE FOLLOWING PERSONNEL FROM PARTICIPATING HOSPITALS

Austin and Repatriation Medical Centre:

Mrs Helen Fithall, HITH Coordinator

Ms Joanne Silvilogou, Transition Coordinator

Ms Kathy Kovco – Assistant Health Information Manager

Bendigo Health Care Group: Ms Robyn Faye, HITH Coordinator

Ms Christine Dridan, Transition Coordinator

Mr Faye Rea, Medical Records

Ballarat Health Services: Ms Trish Twaits, HITH Coordinator

Benalla & District Memorial Hospital:

Ms Marg Aldous, HITH Coordinator

Mr. Rick O'Bree, Director of Finance

Mr Dale Fraser, Finance Manager

Box Hill Hospital:

Mr Peter Hutchinson, Finance Manager,

Mr Wayne Stoll, Finance Director

Ms Helen Hamilton, HITH Coordinator

Mr Andrew Zafirakos, Head Health Information Services

Colac Community Health Services:

Ms. Marie-Louise Tucker, Nurse Manager- Home Nursing

Mr. John Scarrott, Chief Executive Officer

Djerriwarrh Health Services: Ms Jane Cape, HITH Coordinator

East Grampians Health Service (Ararat):

Mr Ken Macdonald, Finance Manger

Ms Yvonne Byron, HITH Coordinator

Ms Nickie Blackie, Health Information Manager

Echuca Regional Health:

Ms Dianne Egan, HITH Coordinator

Mr. John Taylor, Finance Manager

Frankston Hospital:

Dr Micheal Montalto, HITH Coordinator

Mr Sean Downer, Clinical Costing

Geelong Hospital:

Ms Helen Wadsworth, HITH Coordinator

Mr Garry Ellis, Finance Manager

	Ms Rosilyn Edsell, Medical Records
Goulburn Valley Base Hospital:	Mrs Kerry Healy, Director of Finance
	Dr Wayne Thompson, HITH Coordinator
	Ms Jill Brooke, Medical Records
Latrobe Regional Hospital	Ms Rosemary Nation, HITH Coordinator
	Mr Bill Munday, Finance
	Ms Michelle Thompson, Patient Services Manager
Maroondah Hospital:	Ms Cheryl Cameron, Management Accountant
	Ms Robyn Kirsch, Assoc Charge Nurse, HITH
Mercy Hospital – Werribee Campus:	
	Mrs Jennie Lovel, HITH Coordinator
	Ms Lorraine Lambert, Medical Records
	Ms Vickie Geytenbeek, Chief Executive Officer
	Mrs Cheryl Cohan, Clinical Costing
Mercy Hospital for Women:	Ms Dianne Morgan, HITH Coordinator
	Mr Peter Kenny, Director of Finance
	Ms Wendy Ireland, Finance
	Ms Lisa Hales, Medical Records
Mildura Base Hospital:	Ms Sheena Clark, HITH Coordinator
	Mr Brad Mottram, Finance Manager
	Ms Judy Compt, Medical Records
Monash Medical Centre & Dandenong Hospital:	
	Ms Beverly Macauley, Clinical Costing
	Ms Tracey MacBean, Clinical Costing
	Mrs Janet Reark, Information Systems
Peter MacCallum Cancer Institute:	Mr Max Paterson, Clinical costing
	Dr G Toner, Head Oncology Unit
	Ms Ilka Carapina, Medical Records
Portland & District Hospital:	Mr Wayne Armistead, Finance Manager
	Ms Hazel Anthony, HITH Coordinator
	Ms Marie Young, HITH Coordinator
Royal Children’s Hospital:	Louise Devereux, Nurse Manager , Home Based Services
	Ms Jane Widdison, Clinical Costing Hospital Support
	Ms Melinda Onori, Medical Records



Royal Woman's Hospital:	Mr Dean Athan, Clinical costing Ms Pam Bull, HITH Coordinator
Royal Melbourne Hospital:	Ms Genevieve Chappell, Health Information Manager Ms Anna DeFlorio, HITH Administrative Officer Mr Henry Wan, Clinical Costing: North Western Health
St. Vincent's Hospital:	Ms Tamara Rowan, HITH Coordinator Ms Cheryl Apperly, Clinical Costing Coordinator Ms Barbara Arundell, Health Information Manager
The Alfred Hospital	Ms Dianne Richards, Manager Alfred at Home Ms Angela Franzone, Decision Support Officer Ms Linda Seghesio, Medical Records
The Angliss:	Mr Wayne Massuger, HITH Coordinator Ms Fran Brockhus, Manager Information Systems
The Northern Hospital:	Ms Ann Bently, HITH Coordinator Ms Judy Wignall, Finance Manager Ms Jackie MacLeod, Medical Records
Wangaratta Base Hospital:	Mr Brian Hansen, Finance Manager Ms Cathryn Hattersly, Manager Home Nursing Ms Angela Astbury, Health Information Manager
Warrnambool & District Base Hospital:	Mr Ian Barton, Director of Finance Mr. Mark Johnston, HITH Coordinator
Western Hospital:	Mr Elwyn Davies, HITH Coordinator
Western District Health Service:	Mr Richard Staude, Finance Manager Mrs, Betty, Joosen, HITH Coordinator
West Gippsland Healthcare:	Ms Catriona Duncanson, Clinical Costing
Williamstown Hospital:	Ms Alison Chircop, HITH Coordinator Mr Peter Dyer, Finance Manager
Wodonga Regional Health Service:	Mr Leo Andronicos, Director of Finance Ms Dianne Wicks, HITH Coordinator

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