Hospital in the home: a concept under question

Gideon A Caplan

The debate on its efficacy has been reignited

Improvements in technology and greater acceptability have narrowed the gap between care in the hospital and care in the home. More patients with more diagnoses are receiving a greater diversity of hospital-type treatments at home than ever. However, the schism that once existed between hospital and home for treatment has opened up within the "hospital in the home" (HITH) movement over whether the concept works at all.

In the early days, anecdotes suggested better outcomes at home, the only plausible mechanism being avoiding the risks of hospital. Then, it was easy to consider the high rate of adverse events in hospital and believe that HITH must reduce these. Because hospital-related adverse events are more common in older patients,[1] it seemed plausible that older patients may have more to gain from HITH. However, the wide variety of adverse events hinted at difficulties in capturing the difference. It seemed even more obvious that replacing care in hospital with care at home must be cheaper. But critics thundered that HITH offered inferior care at greater cost.[2] Both sides spoke without fear of contradiction because evidence was absent. But now there is evidence, and the debate has been reignited: Is HITH a true advance on in-hospital treatment with reduced complications, better health outcomes and greater patient satisfaction? Is it even cost-saving, or just a waste of money?

On one side sits the Cochrane review, *Hospital at home versus in-patient hospital care*.[3] This meta-analysis of 22 randomised controlled trials (RCTs) clearly concluded that there is no difference in outcomes and no cost savings! However, the review grudgingly accepts that patient satisfaction is greater with HITH than with hospital. The Cochrane process carefully sifted the trials to determine methodological rigour — whether the patients were adequately randomised, etc. Unfortunately, this sifting process did not include a criterion as to whether the basic experiment succeeded. One may assume that a review entitled *Hospital at home versus in-patient hospital care* would include only trials where patients in the control arm received their treatment in hospital, while those in the other arm received treatment entirely or almost entirely at home as a substitute for in-hospital care, with a curative intent. Studies of intensive palliative care at home should properly be called "hospice in the home".

Unfortunately, in one large study included in the Cochrane review, there was no statistically or clinically significant substitution for care in hospital by care at home. The study recruited older medical patients and the control group stayed in hospital 13.20 days while the group randomised to "HITH" was discharged 0.36 days earlier from hospital and then received an additional 9.04 days of "HITH" care at home.[4] If the patients in the treatment group were not discharged from hospital earlier than the control group, that study does not meet the Cochrane review's own definition of HITH, namely "treatment . . . that otherwise would require hospital in-patient care", and should clearly have been excluded.

Clouding by a study that did not meet HITH criteria was not the only impediment to discovering whether there was an improvement in health outcomes. Where outcomes were assessed, this was almost always done after discharge, often 3 or more months later. To be fair though, no one knew exactly what the difference in outcomes was, and so what "instrument" to use, at what time (during or after the admission) and how frequently to look for it, and in what patient group.

On the other side, and providing the first inkling that there may be a difference, but that we had been looking at the wrong time, was an article published in this Journal. An RCT of 100 emergency department patients found a 20% decrease in the incidence of confusion in HITH.[5] Three subsequent studies have now confirmed this. A trial (not an RCT) of surgical patients found less postoperative cognitive dysfunction at 7 days after day surgery compared with inpatient surgery.[6] A United States multicentre trial (not an RCT) and an Australian single-centre RCT both showed significant decreases in delirium using the Confusion Assessment Method during the admission (to either hospital or HITH) for medical patients in HITH compared with hospitalised patients.[7,8] The manifestation of this phenomenon in both medical and surgical patients demonstrates that the underlying diagnosis is not important, but the substitution of HITH care for in-hospital care is critical.

Delirium is the "canary in the coalmine" of aged care — a transient early warning of increased mortality, nursing home placement and impaired physical and cognitive function. So, if delirium is reduced by HITH keeping patients out of hospital, you would expect to find reduced mortality and placement, and improved function, though a very large study or meta-analysis might be needed, because these events are less common than delirium. The Cochrane review, interestingly for a meta-analysis, does not combine all the data for mortality, and produces two solidly non-statistically significant results. But, if you combine all the Cochrane studies that measured mortality, excluding the palliative care studies (as Cochrane does) and the no-

substitution study that should have been excluded, the odds ratio for mortality in HITH becomes a near-statistically significant 0.76 (95% CI 0.57–1.01; $P = 0.0599$)! The fact that it is not significant is probably a type II error. Interestingly, both groups in the Cochrane analysis, after removing the failed HITH trial, show an odds ratio of about 0.76 for mortality, indicating homogeneity. Even with borderline statistical significance, a one-quarter reduction in mortality from 17.8% to 13.4%, with a number needed to treat in HITH to prevent one death in 25, is clinically significant.

Assessment for function in HITH studies shows two patterns. Studies where HITH substituted for hospital admission found that physical and cognitive function were improved.[9,10] In studies in which patients are discharged early to HITH, the general focus on rehabilitation means that both groups attain comparable function. There are insufficient data on nursing home placement to draw conclusions.

The problems with the financial analyses are similar, but simpler. Services where HITH is not a substitute for in-hospital care, but merely add-on care, are bound to be more expensive, no matter how sophisticated the economic analysis.[4] Where HITH substitutes for in-hospital care, and the service works at reasonable capacity, HITH is cheaper than hospital.[11]

All the pieces are in place, though more evidence is needed to achieve statistical significance. The evidence clearly leads towards a conclusion that HITH offers better health outcomes and a reduction in costs.

Author details

Gideon A Caplan, MBBS, FRACP, Director, Specialist Geriatrician and Acting Director,[1] and Conjoint Associate Professor[2]

1 Hospital in the Home, Post Acute Care Services, Prince of Wales Hospital, Sydney, NSW.

2 School of Public Health and Community Medicine, University of New South Wales, Sydney, NSW.

Correspondence: g.caplan@unsw.edu.au

References

1 Leape LL, Brennan TA, Laird N, et al. The nature of adverse events in hospitalised patients: results of the Harvard Medical Practice Study II. *N Engl J Med* 1991; 324: 377-384.

2 Larkins RG, Martin TJ, Johnston CI. The boundaryless hospital — a commentary. *Aust N Z J Med* 1995; 25: 169-170.

3 Shepperd S, Iliffe S. Hospital at home versus in-patient hospital care [review]. *Cochrane Database Syst Rev* 2005; (3): CD000356.

4 Shepperd S, Harwood D, Gray A, et al. Randomised controlled trial comparing hospital at home care with inpatient care. II: cost minimisation analysis. *BMJ* 1998; 316: 1791-1796.

5 Caplan GA, Ward JA, Brennan N, et al. Hospital in the home: a randomised controlled trial. *Med J Aust* 1999; 170: 156-160.

6 Canet J, Raeder J, Rasmussen LS, et al. Cognitive dysfunction after minor surgery in the elderly. *Acta Anaesthesiol Scand* 2003; 47: 1204-1210.

7 Leff B, Burton L, Mader SL, et al. Hospital at home: feasibility and outcomes of a program to provide hospital-level care at home for acutely ill older patients. *Ann Intern Med* 1997; 127: 989-995.

8 Caplan GA, Coconis J, Sayers A, Board N. A randomised controlled trial of Rehabilitation of Elderly and Care at Home Or Usual Treatment (The REACH OUT Trial). *Age Ageing* 2006; 35: 60-65.

9 Leff BA, Burton L, Burl J, et al. Return of physical function among patients eligible for home hospital treatment. The Johns Hopkins home hospital national demonstration and evaluation study. *J Am Geriatr Soc* 2003; 51 Suppl: S33.

10 Caplan GA, Coconis J, Woods J. Effect of hospital in the home treatment on physical and cognitive function: a randomized controlled trial. *J Gerontol Biol Sci Med Sci* 2005; 60: 1035-1038.

11 Board N, Brennan N, Caplan GA. A randomised controlled trial of the costs of hospital as compared with hospital in the home for acute medical patients. *Aust N Z J Public Health* 2000; 24: 305-311. ❑