

Length of stay patterns for patients of an acute care hospital: implications for nutrition and food services

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Abstract

Objective: Shortened hospital average length of stay (ALOS) has been used to justify rationalisation of some services, but, by definition, some patients stay for longer than the average. The objective of this study was to explore lengths of stay and proportions of hospital occupied bed-days (OBDs) of those admitted for longer time periods to inform service planning.

Methods: The proportion and ALOS of overnight separations at an Australian tertiary hospital were assessed for admissions of up to 4 days and 4 days or more. This was repeated for 7, 14 and 28 days. The proportion of OBD's for each time period was determined.

Results: While the proportion of total hospital patients staying for 4, 7, 14 and 28 days or more is relatively small (21.9%, 13.5%, 6.2%, 2.6%, respectively), they represent a large proportion of OBD's (74.9%, 67.2%, 50.8%, 34.2%) with an ALOS of 14.0, 20.3, 33.7, and 54.4 days, respectively. The majority of long-stay patients were in acute care.

Conclusion: Substantial proportions of OBD's are due to patients admitted for time periods far greater than reflected by ALOS. Hospitals need to rethink how to optimally accommodate the nutrition and food requirements of the large patient numbers admitted for longer time periods, many of whom are at increased risk of malnutrition.

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What is known about the topic?

Average length of stay is routinely reported for hospitals, but the skewed nature of length of stay conceals the proportion of beds occupied by those staying for extended periods of time.

What does this study add?

This study quantifies the substantial proportion of acute care bed-days occupied by those hospitalised for weeks or months.

What are the implications for practitioners?

The authors suggest the need for inpatient services planning that recognises that half of the hospital beds in the tertiary hospital in this study were occupied by people admitted for 2 weeks or more.

THE AVERAGE HOSPITAL LENGTH OF STAY has reduced over recent years in Australia. Average lengths of stay (ALOS) in Australia decreased between 1997–1998 and 2001–2002¹ from 4.1 to 3.6 days. This was accompanied by an increasing trend towards day procedures from 46.3% in 1997–1998 to 52.3% in 2001–2002.¹ With day surgery figures removed, the average length of stay in Australian hospitals had still decreased from 6.7 days in 1997–1998 to 6.5 days in 2001–2002.¹ These results were similar to other countries of the OECD (Organisation for Economic Co-operation and Development).¹ Such averaged figures do not consider the skewed nature of a hospital population resulting from the combination of same-day, short and longer stay separations.

Shortened lengths of stay have been used as the basis for decision making regarding hospital services such as nutrition and food services.^{2–4} Menu cycles have been shortened, and consequently the variety and nutritional content of menus influenced, on the basis of the ALOS being less than 1 week.^{2,4} The purpose of this study was to explore the lengths of stay at a

I Number and proportion of separations and average length of stay for patients admitted for different time periods

Days admitted	No. annual separations	Proportion of hospital separations		Mean length of stay (days)	Median (range)	Proportion of overnight occupied bed-days
		Total	Overnight			
4 or more	13 606	21.9%	49.4%	14.0	8 (4–339)	74.9%
7 or more	8 404	13.5%	30.5%	20.3	12 (7–339)	67.2%
14 or more	3 837	6.2%	13.9%	33.7	24 (14–339)	50.8%
28 or more	1 598	2.6%	5.8%	54.4	43 (28–339)	34.2%

tertiary teaching hospital and the proportion of the hospital beds occupied by people admitted for longer periods, to establish the exact nature of the hospitalised population for planning nutrition and food services.

Methods

The length of stay for all separations during 2002 and 2003 from the Princess Alexandra Hospital, Brisbane, was investigated. Princess Alexandra Hospital is a 750-bed (including 144 rehabilitative beds) tertiary teaching hospital. Initially, analyses were completed using all hospital separations, as reported hospital ALOS is inclusive of both same-day and overnight separations. Overnight separations are all separations excluding same-day separations. The proportion of both the total hospital separations and the overnight hospital separations represented by those admitted for 4, 7, 14 and 28 days or more was calculated.

The ALOS and proportion of separations were then determined for overnight separations for each ward for those admitted for 4 days or more, and compared with those admitted for up to 4 days. This was repeated for the admission periods of 7, 14 and 28 days. Medians and ranges were also obtained. The occupied bed-days were calculated from the average length of stay and number of separations for each ward. Wards were separated into acute and rehabilitative care, and results for these areas compared to determine if the majority of long-stay patients were from the

rehabilitative wards. A very small percentage of the total hospital separations were represented by palliative care, geriatric evaluation and boarders, and these were excluded from the sub-analysis of the acute and rehabilitative care areas. Calculated occupied bed-day (OBD) figures were verified against available monthly health information management data of hospital OBDs by ward to confirm acceptable accuracy of the calculated figures.

Results

Data from 2002 and 2003 were found to be similar; consequently 2003 data only are presented.

Length of stay and occupied bed-days for the overall hospital population

In 2003 there were 62 202 separations with 55.7% (34 654) being same-day patients. The ALOS for all hospital separations was 4.1 days, but increased to 8.4 days when same-day patients were excluded. The median of all separations was 1 day (range 1–339 days) with the median of overnight separations being 4 days (range 1–339 days). The ALOS for the individual rehabilitative wards ranged from 18.2 to 43.5 days in 2003.

The ALOS, proportion of separations and calculated OBDs for patients staying at least 4, 7, 14 and 28 days are shown in Box 1. Patients who stayed 4 days or more accounted for about 75% of the overnight OBDs and had an ALOS of 14 days, although they represented only 21.9% of the total hospital separations. Although only rep-

2 Number and proportion of overnight hospital separations and beds-days occupied from acute and rehabilitative separations according to length of stay category

Days admitted	Separations				Occupied bed-days			
	Total	Acute (No. [%])	Rehabilitative (No. [%])	Other** (No. [%])	Total	Acute (No. [%])	Rehabilitative (No. [%])	Other** (No. [%])
	62 202	60 879	973	350	254 079	213 385	33 409	7 385
4 or more*	13 606	12 592 (92.5)	792 (5.8)	22 (1.6)	190 484	151 104 (79.3)	33 264 (17.5)	6 116 (3.2)
7 or more*	8 404	7 450 (88.6)	755 (9.0)	198 (2.4)	170 782	130 790 (76.6)	32 879 (19.3)	7 113 (4.2)
14 or more*	3 837	3 039 (79.2)	634 (16.5)	164 (4.3)	129 186	90 725 (70.2)	31 700 (24.5)	6 761 (5.2)
28 or more*	1 598	1 071 (67.0)	422 (26.4)	105 (6.6)	86 882	53 875 (62.0)	27 411 (31.5)	5 596 (6.4)

*Excludes same day patients **"Other separations" include boarders, palliative care, maintenance and geriatric evaluations.

representing 6.2% of all hospital separations, those who stayed 14 days or more accounted for 50% of the overnight OBDs and had an ALOS of over 1 month. A similar pattern of results is shown for 7 and 28 days (Box 1).

Length of stay and occupied bed-days in acute and rehabilitative care

Box 2 shows the number and proportion of total hospital separations and occupied bed-days by category for acute and rehabilitative care. For patients admitted for 14 days or more, almost 80% were in acute care, with acute care patients accounting for 70% of the overnight OBDs.

Discussion

ALOS and implications of same-day procedures

Over half of the hospital's more than 60 000 separations were same-day procedures in 2003. This figure was slightly more than the 52.3% reported nationally in 2001–2002.¹ A hospital's average length of stay is a commonly reported statistic which is influenced by the inclusion of same-day separations. Averaged figures were shown to conceal the true picture of the length of admission for many of the people occupying hospital beds. Australia's ALOS increased from 3.6 to 6.5 days (2002–03) when same-day procedures were excluded.¹ We found a similar

trend, with an increase in ALOS from 4.1 to 8.4 days when same-day procedures were excluded.

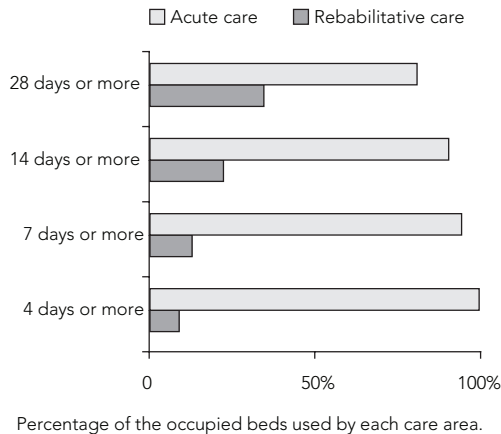
Length of stay according to category

A large proportion of the hospital's bed-days were occupied by a comparatively small number of hospital separations. About 20% of hospital separations were associated with stays of 4 days or more, but represented around 75% of the hospital's overnight occupied beds, with an ALOS of around 2 weeks. Around 50% and 34% of hospital bed-days were occupied by those admitted for 14 and 28 days or more, with an ALOS of over 30 and 50 days, respectively, although they represented only 6% and 3% of hospital separations.

The majority of longer stay separations received acute rather than rehabilitative care (Box 3). Almost 80% of people admitted for greater than 14 days and 67% of people admitted for greater than 28 days received acute care. The majority of long-stay admissions were not receiving rehabilitative care.

The ALOS figures used underestimated actual ALOS. All patients admitted for an acute condition who are then reassessed as a sub- and non-acute patient (SNAP) are recoded with a subsequent recommencement of the length of stay figures. Transfers from acute to rehabilitative care are coded as a new admission and the length of stay recommences even though a person is continuing their care at the hospital. Consequently, actual lengths of stay are anticipated to be greater

3 The proportion of the total hospital occupied bed-days represented by acute and rehabilitative care by length of stay category



than the level indicated for both acute and rehabilitative areas.

Usual measurement of hospital stay

ALOS is indicative of overall trends in hospital admissions but may skew decisions regarding service planning. Presenting means is appropriate only when data are normally distributed.⁵ Hospital length of stay data are highly skewed, as over half of the admissions are same-day patients. The convention of presenting mean length of stay data obfuscates the picture regarding the length of hospital admissions.¹ Medians and ranges more appropriately represent lengths of hospital admission and so were presented alongside the conventional ALOS figures. However, they did not further inform the lengths of stay of hospital patients. A low median reflects the large number of day admissions as the median is the middle measurement in ordered data. What is required is an assessment of the proportions of hospital admissions staying for specified periods of time.

Implications for nutrition and food services

Services with greater lengths of stay, such as nursing homes, frequently plan longer menu cycles of several weeks,⁶ while hospital menu cycles are

routinely shorter.⁷ The need for appropriately responsive menu and food service systems is often recognised for hospital rehabilitation services where the ALOS is thought to be greater (eg, over 17 days compared with 4 days for the overall hospital in this study). Although the rehabilitative services within the hospital had greater ALOS, it became clear that the greatest number of beds occupied for 2 weeks or more were located in the acute care areas.

This study confirms that it is no longer appropriate to justify hospital nutrition and food service decisions based on short average lengths of stay. Acute care hospital nutrition and food services must accommodate the nutrition and food needs of the longer stay, acutely ill admissions found to occupy half of the hospital beds. Both oral intake and satisfaction with hospital food services have been found to decline with increased LOS.⁸ This study's findings that a large proportion of occupied beds were for admissions over longer time periods than previously recognised should be of concern to health service providers.

Although adequate food is provided, a substantial proportion of people in hospital consume less than half their energy requirements.⁹⁻¹¹ The intake of 59% of suboptimal eaters was not affected by disease but related to inadequate meal services and lack of choice.^{12,13} Both extremes of the short and the long stayers were identified to be at risk.¹³ Greater efforts need to be made to prevent the nutritional decline,¹⁴ given the difficulties of reversing it. The less well nourished also have an increased mortality risk.¹⁴ The fact that half of the hospital beds have people staying longer than previously recognised reinforces the importance of skillfully designed nutrition and food services that consider not only a nutritionally adequate menu, but the multitude of other factors that ensure successful meal consumption.

Nutrition and food services advancements are required to ensure: menus that consider the needs of the substantial proportion of long stayers, dining environments (eg, bistro or dining room in contrast to bed), meal-time atmosphere,^{15,16} proximity of meal choice to delivery,¹⁷ energy-

dense meals,¹⁸⁻²⁰ assistance with meals,²¹⁻²³ nursing staff involvement in meal times,²⁴ early identification and intervention for those at nutritional risk,²⁵ and ease of access to nutritional supplements.²⁶ Supplementation has not been found to reduce other oral intake.²⁷ Such patient-focussed changes to the hospital meal provisions have improved intakes and reduced waste, and hospital nutrition and food services can provide suitable food options and meal services while remaining within service constraints.²⁸ A range of strategies and a multidisciplinary approach encompassing food service, nutrition and dietetics as well as nursing roles are essential to achieving optimal service provision and client care.^{11,29}

Health outcomes influenced by nutrition and food services

In contrast to limiting food and nutrition services when maintaining budgets, improving and expanding nutrition services can reduce malnutrition and hospital costs through early rather than late nutritional interventions.²⁵ A range of 12%–42% malnutrition prevalence has been found in studies of Australian hospitals.³⁰⁻³⁴ Studies also show that nutritional status declines during admission.^{9,14,35} The substantial proportion of beds occupied for 2 weeks or more and the high prevalence of malnutrition in hospital populations³⁶ makes nutrition and food of particular significance.

Malnutrition has been shown to be associated with adverse clinical outcomes (morbidity and mortality) and costs.^{25,37} To “first do no harm” is a basic tenet of care but cannot be guaranteed during modern hospital admissions.³⁸ The progression of malnutrition during hospital admission could be considered alongside other non-desirable adverse events such as falls, infection or medication errors.³⁹

Malnutrition is being incorporated into risk management and reporting systems (such as PRIME, Queensland Health). Improving patient safety during admission by ensuring that the practical, food and nutritional needs of our patients are met is an organisation-wide challenge and responsibility.

Conclusions

A large number of hospital beds are occupied with patients admitted for far longer than the frequently quoted ALOS. Over 50% of a tertiary teaching hospital's overnight bed-days were occupied by those staying 14 days or more, although they represented only 6% of hospital separations. Almost 80% of the people admitted for 14 days or more received acute care. This study reinforced the importance of recognising that a skewed hospital population exists, with a substantial proportion of admissions staying much longer than would be anticipated from hospital average length of stay figures. When designing responsive and appropriate services such as nutrition and food services, it is valuable to establish the proportion, type of patients and duration of admission for longer stay patients. With increasing interest in the prevention of adverse events and in clinical incident reporting, nutrition and food service systems may come under greater scrutiny if nutritional decline has contributed to morbidity or mortality.

Competing interests

The authors declare that they have no competing interests.

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