Length of stay
How short should hospital care be?

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Background: Reducing length of hospital stay (LOS) is a policy aim for many health care systems and is thought to indicate efficiency. Methods: A MedLine search was undertaken for articles relating to 'LOS', 'early discharge' or 'patient discharge' between 1983 and 1997 and a selective search was undertaken for material published before 1983. Results: Routine data showed that there were variations in LOS between countries, regions and hospitals. The trends in LOS showed a decrease over time in all regions. Research consistently fails to show an adverse effect on health outcomes of reducing LOS, but there may nevertheless be an ethical or moral minimum LOS. Two recent examples illustrate this. There has been an outcry at some ultrashort stays, for example 'drive-through mastectomy' and 'lunchtime abortion' and these are discussed in the review. Conclusions: There are a number of reasons for the perceived lack of relationship between LOS and health outcomes. Clearly reducing days of care at the low-intensity end of a hospital stay may not necessarily affect health outcomes. There is a case to be made for tailoring care more exactly to an individual's needs by looking at the actual components of care rather than the place of care - within or outside hospital walls.

Keywords: appropriateness review, early discharge, episodes of care, length of hospitalisation, length of stay, practice pattern

In a White Paper on the NHS, the UK Government identified reduction in length of stay (LOS) as a component of efficiency - one of its six dimensions of performance. Implicit in this suggestion is the proposition that the lower a hospital's LOS the greater is its efficiency. This view gathers strength from the lack of evidence of an association between shorter LOS and poorer health outcomes. In many health systems there are managerial and financial incentives to reduce LOS. However, there is tension between reducing LOS in order to increase throughput (thus allowing more patients to be treated) and maintaining the appropriateness of care offered. This point is rarely appreciated by those keen to see LOS reduced as a marker of efficiency. A reduction in LOS may also cause increased expenditure since it may cause an increase in the number of high intensity days of hospital care at the expense of less costly lower intensity days at the end of a hospital stay. An additional, well-recognised economic effect of reduction in LOS may be in cost-shifting onto community carers, relatives and friends. As boundaries in health care become increasingly blurred and as care once offered only to in-patients is offered in an ambulatory or primary care setting, it is worth considering what is actually involved in hospital care. What are the elements of hospital care that may affect health outcomes and do these have a relationship with the overall number of days a patient spends in hospital? How important is the actual presence of a patient within a hospital boundary or wall and what benefits can this confer over and above care in another setting? It is likely that length of hospital stay will increasingly become an outdated measure of performance and that more accurate measures of actual care and treatments given - regardless of setting - may become much more important. In this update of a previous review article some of the questions and issues involved in reducing LOS are discussed, including variations and trends in LOS, new evidence of the lack of relationship between LOS and health outcomes, changes in the patterns of care that may affect reasons for trying to reduce LOS and possible moral or ethical limits to the continuing drive to reduce LOS.

METHODS
A MedLine search was undertaken for articles published over a 14 year period (1983–1997) with 'LOS', 'length of hospital stay' or 'length of hospitalisation' in the title or abstract and with the catalogue subheadings 'economics, statistics or numerical data and trends'. A further similar search was undertaken with the headings 'patient discharge' and 'early discharge'. Abstracts were screened by one of the authors (A.C.) and articles obtained if the content was deemed relevant. Articles were included if they referred to acute in-patient care. They were excluded if they met the following criteria.

• They referred exclusively to LOS as an outcome variable in an evaluation of an intervention (e.g. in the use of a new drug or surgical technique).
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They referred to LOS as only part of a hospital stay (e.g. intensive care or in some kind of rehabilitation facility).

They were related exclusively to psychiatric diagnoses.

A selective search for relevant literature prior to 1983 was undertaken and unpublished sources were included as obtainable. The total literature searches revealed 548 published articles and 66 relevant articles were included in this review. The articles were not graded on their methodology but methodological issues are mentioned in the text if it was thought there was the potential of them affecting the validity of the results.

RESULTS

Variations and trends in LOS

Figures 1 and 2 show differences in LOS for cataract extraction and fractured neck of femur respectively in a number of countries using the OECD Health Data File. Comparisons should be made cautiously since a variety of different methods were used in recording, collection and quality control of these routine data. Nevertheless, LOS appeared to vary considerably between countries. For example, in figure 1 LOS for cataract extraction varied from over 6 days in Italy in 1993 to just over 1 day in the USA in the same year. Similar variation is shown in figure 2 for fractured neck of femur admissions. Although differences in clinical practice in the treatment of fractured necks of femur and in the availability and location of different types of aftercare might account for some of the differences shown, there was still a more than twofold variation between the country with the longest LOS, New Zealand and the USA, with the shortest LOS. This type of variation has been discovered and reported on numerous occasions for all types of hospital patients. These dramatic differences can only be partially explained by differences in case mix and are also associated with variation in the pattern of supply of services, particularly hospital beds. More beds appeared to allow for a longer LOS when adjustment for all other relevant factors was made. A somewhat surprising finding apparent from some of the studies was that patients of the same consultant may had different LOS if treated in different hospitals when appropriate adjustments for case mix were made. The individual consultant appeared to have less effect on LOS than might be expected. It appears that clinicians tended to conform to a hospital norm, which may partly reflect the pattern of supply and organisation of surrounding health care facilities.

Reductions in LOS over time

Figures 1 and 2 also show reductions in lengths of hospital stay for European and OECD countries between the years 1988 and 1993. LOS dropped in each country for both procedures. Numerous examples of reductions in LOS over time have been reported, both for total LOS and for LOS for specific diagnoses or procedures; examples include acute myocardial infarction in the USA or fractured neck of femur in Australia. Again, caution has to be exercised in making assumptions about case mixes when LOS is being compared. Nevertheless, it is unlikely that these striking differences over time can be due to differences in case mix alone and in some of the studies careful adjustment for case mix does not appear to rule out the effect.

Figures 1 and 2 also show that, as LOS continued to fall, countries appeared to have a similar rank order in 1986 and 1993; the differentials in LOS in 1986 appeared to be largely maintained in 1993. This has also been described for differences in LOS found in the USA.

Is there a relationship between health outcomes and LOS?

Although anxiety has often been focused on the potential adverse effects of shorter LOS, in fact a longer than standard LOS has been found to be related to adverse outcomes. Examples include longer LOS associated with complications, hospital-acquired infection, adverse drug reactions or need for social care. Of course, the causal direction of the associations is not always clear. For example, do patients stay in hospital longer because they have a complication? Or could a longer LOS itself cause complications? One of the outcomes most
frequently investigated in examining the effects of a shorter LOS is the emergency readmission rate which uses the car breakdown model of health care.39 ('If I take my car into a garage I would expect not to have to return it within a short time period for further work.') However, this model does not fit many types of health care40,41 and there is no firm evidence for an increase in readmission rates in response to reductions in LOS.42-44

It may be that there is a theoretical minimum below which LOS should not fall, but no research to date has convincingly shown a relationship between shorter LOS and health outcomes, for example poorer scores on measures of clinical disease or health status. However, this sort of research can rapidly become out of date as LOS continues to decline. One of the few randomised trials in this field exemplifies this problem: in that trial patients were kept in hospital for up to four days after varicose vein surgery, but today's varicose vein surgery patients are unlikely to stay more than 24 hs and the findings are no longer applicable.45,46 More recently, studies showing no effect of a shorter LOS on health outcomes have been reported for patients undergoing breast cancer surgery,47 carotid endarterectomy,48 cleft lip and palate treatment,49 myocardial infarction, coronary artery bypass graft surgery, total hip replacement, cholecystectomy, transurethral prostatectomy50 radical retropubic prostatectomy,51 and abdominal and vaginal hysterectomy.52

Why has a relationship between health outcomes and shorter LOS not been found?
The range of health care interventions offered in the home is increasing all the time, for example in the use of intravenous antibiotics at home for patients with AIDS.52 The care that only a hospital can offer is limited. When appropriateness instruments are used to try and answer the question ‘which patients in hospital are undergoing care that only a hospital can offer?’, 10–25% of patients have been found to be in hospital inappropriately.53-55 However, the type and complexity of care which can be offered outside hospital is constantly changing and appropriateness studies, such as LOS studies, tend to become rapidly outdated. Many studies have examined the outcomes of reducing low-intensity hospital care at the end of a hospital stay for routine elective surgery. Here, with appropriate vigilance and home care provided either by relatives, friends or trained nurses, home care may well offer an advantage over hospital care and provide a more personalised care plan with increased autonomy and quality of life.56,57

These benefits may well outweigh the benefits of continuing hospital care. Thus, a relationship between health outcomes and shorter LOS has not been found because active care may be completed before the end of a LOS, or may finish in another setting afterwards. LOS is not necessarily a good marker for the amount of care received and would not therefore be expected to be related to health outcomes. The main advantages of care in hospital for a post-surgical patient are likely to relate to a more rapid response to a crisis, for example, more immediate access to repeat surgery, intensive therapy or coronary care, but these are likely to be rare requirements for many patients. This fact has been recognised in one investigation in the USA of the benefits of ‘bundling’ post-acute out-of-hospital care with Medicare DRG payments.58

Two studies have shown interesting features of how the drive to reduce LOS interacts with the appropriateness of care offered. In one study of the introduction of paediatric day surgery, the new day care unit acted in addition to the standard care unit. The authors found that, as a result, the overall volume of surgery undergone by a static population of children increased — an unintended result.59 In another study, LOS fell as the incidence of fractured necks of femurs rose — the same volume of hospital resources (numbers of beds, theatres, surgeons, etc.) was used to treat a much higher volume of patients.18 Contrasting studies in Spain and Italy have shown that increasing throughput and reducing LOS do not necessarily increase the appropriateness of patients' stay in hospital.53,54

Why try to reduce LOS?
From the health care provider's point of view, there are potentially three aims to reducing LOS. The first aim relates to the care of the individual and is to tailor care, including LOS, most appropriately to the needs of the individual patient. Many patients would rather be cared for in their own home if care can be provided safely. And of course there may be an increase in the costs to the patient or their home carers.60,61 However, this was not found by Fulop et al.62 in an evaluation of a hospital at home scheme. General practitioners were supportive and the study suggested that it did not increase their workload.

The second and third aims of reducing LOS relate to the planning and management of overall health care resources. The second aim may be to reduce LOS in order to reduce the resources spent on the individual, thus releasing resources to be spent on other patients. The third aim is to reduce overall spending by reducing the resources spent on each individual. If this latter aim is to be achieved then saving money requires closing hospital wards and beds and making staff redundant. It is often unclear which of these aims is being pursued in drives to reduce LOS and it may be that different aims are pursued at different policy levels.1

Are there limits to reducing LOS?
Even if a constantly reducing LOS is technically safe, there may still be a 'right' LOS below which further reduction results in adverse effects on patient satisfaction. In addition, there may be a general societal view of the amount of care any particular condition might reasonably require. Evidence for an effect of reduced LOS on patient satisfaction is mixed. Some patients express increased satisfaction with a longer LOS63,64 and some the reverse.65 However, two recent examples illustrate the point at which a minimum acceptable LOS may have been reached because of a popular view of what constitutes appropriate care. In the first case in early 1997, there
was a public outcry in the USA against ultrashort-stay 'drive-through' mastectomy.\textsuperscript{66-68} Whilst there may be no clinical contraindication to this, an outcry presumably occurred because this is such an important and potentially distressing operation. Could care be adequate if the patient stayed in hospital for less than 1 day? In the UK there was a similar public outcry at the opening of a clinic specifically described as being able to offer women 'lunchtime abortions' – women could nip out of the office apparently for lunch and instead undergo a termination of pregnancy.\textsuperscript{69} Again there is no problem with the technical feasibility of the operation, but this was thought to be an inappropriate length of time for care for those undergoing abortion. These controversies raise questions about the nature of public expectations of hospital care. To what extent are these shaped by clinical and technical limits as opposed to public expectations, culture and values. Hospitals may have an important function, for example in legitimising the sick role. Anxiety about the abrogation of this non-technical, caring function of hospital care is liable to raise moral or ethical dilemmas, irrespective of evidence of effects on health outcome. These two examples suggest that there may well be a limit to reductions in LOS or that the need for care by appropriately specialised staff needs to be considered. In addition, many examples have shown that specialised care does not necessarily have to occur within the hospital.

CONCLUSIONS

In conclusion it can be seen that LOS varies and that those variations are not necessarily predictable or rational. LOS continues to decrease over time and shorter LOS does not appear to affect health outcomes adversely. The relationship between reducing LOS and the potential increase in costs of community care has not been clearly elucidated.

There may be a moral or ethical minimum LOS below which care is somehow not deemed ethical or proper, but the debate about LOS also raises wider questions about the exact role of a hospital and the circumstances in which hospital care is appropriate. Harrison and Prentice\textsuperscript{70} asserted that changes in the functioning of the hospital had reached a point (in the UK in 1998) where 'the nature of the acute hospital is being transformed and the typical currency for describing a hospital – the staffed bed – is outdated'. As a corollary it is clear that measuring LOS is also becoming outdated. Harrison and Prentice\textsuperscript{70} also suggested four (rather extreme) descriptions of possible current roles for a hospital: 'a means of encouraging beneficial interaction between clinicians, a device for assembling patients for teaching purposes, a device for reducing risk and for simplifying decision making for others, a managed infrastructure into which other services can plug\textsuperscript{70} (p. 176).

Undoubtedly they were being deliberately provocative in not mentioning prevention of disease or care or cure for the sick and, undoubtedly, these two functions are still absolutely key. However, these authors did make an interesting point about where care should be.

As the acute hospital becomes more busy, and geared to high-technology diagnostic and interventionist care, it may be becoming increasingly inappropriate as a place for offering bed rest, aftercare or any sort of convalescent care. Since responsibilities, caring and care plans can travel with the patient outside the hospital walls, LOS is likely to become both a less meaningful measure of the amount of care received by an individual and a less meaningful measure of the performance or efficiency of a hospital.

Whilst LOS is relatively easy to define and measure, it becomes increasingly difficult to establish what care is actually implied by a longer or shorter LOS?

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