

# THE ECONOMICS OF PRESSURE ULCER PREVENTION

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**C**aring for one elderly patient with a grade IV pressure ulcer is estimated to cost £25,905 for direct and indirect costs. Opportunity costs — or care that is denied to others — is the equivalent of 20 standard cases. Considering the numbers of patients with pressure ulcers, this is significant evidence that the cost of prevention is far less than the cost of treatment. A prevention plan for the large district of London and environs includes assessing those who are at high risk, acquisition of appropriate equipment, a mattress replacement program, and education of all healthcare staff.

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## Introduction

**T**here are now increasing numbers of patients who survive serious illness, or the multiple pathology of disease in old age, who are very much at risk to develop pressure ulcers. There is indeed a serious epidemic, but it remains a silent one hidden under the sheets.

The first aim of care must be the prevention of pressure ulcers. They are very serious for patients who have them and they increase significantly the costs of healthcare. The resources required for healthcare are never going to be able to meet the demand. The economic scene has deteriorated due to the recession, falling tax revenues from the private sector, and the high cost of borrowing as well as increase in raw materials beyond the level of inflation. There is a need for cost effective healthcare now as never before. We need to be able to provide care of an appropriate quality and quantity at the lowest cost.

There is no exact total cost of pressure ulcers known as yet, although there have been many estimates. The total cost was estimated in 1982 as in excess of £150 million (Lancet, 1982). This could mean that each health district may well be spending £750,000 per year on this one condition. Unfortunately, our financial systems are not yet sophisticated enough for us to calculate individual patient costs — costs are usually aggregated for specialty budgets. It is also not clear if these estimates were the total costs of patients with pressure ulcers or the additional cost of healing the pressure ulcer alone. The patient with a pressure ulcer is often a very ill patient and may well represent a complex case. A patient with a penetrating pressure ulcer will need a prolonged hospital stay in order for the ulcer to heal and for the patient's health to improve. This prolonged hospital stay will prevent other patients from using the bed. For elderly patients a long stay in the hospital is particularly serious because they may lose their independence, rehabilitation will be delayed and normal social networks of support may disappear making it very difficult for them to go home.

When considering the economics of a pressure ulcer prevention program, it is worth remembering that it is not just the cost of treating one patient's pressure ulcer during an extended stay, but it is also the benefits foregone of other patients who are denied care. Efficiency within healthcare can be described as making sure that the best output is obtained from the resource put in. To describe care as effective we need to know the standard set and also that the desired goals have been achieved.

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There has been little systematic attempt to estimate the resource consequences of prevention. One study (Altman, 1986) compared the total hospital charges at the Johns Hopkins Hospital for a sample of patients with ulcers (N=30) and a sample of patients at risk of ulcers (N=78). The reported ranges for hospital charges were large for the pressure ulcer group. Unfortunately, no study has yet looked at the influence of the variables of each patient to decide whether it is the pressure ulcer or the other complex pathology of the patient that contributes to additional costs.

During a period of financial stringency it became necessary to justify the cost of a pressure ulcer prevention program. Although we all assumed that a patient who had developed a Grade IV pressure ulcer would be expensive, there were no definitive data available to prove the point. During this time a patient was transferred into St. Bartholomew's Hospital with a complicated hip fracture and a gangrenous sacral pressure ulcer. From the time the patient was admitted the staff were asked to record all items and times of care for the whole of her stay. The costs for this patient are outlined in Table I.

## Opportunity costs

Having looked at the direct costs and the indirect costs incurred by treating an elderly orthopedic patient with a Grade IV pressure ulcer, the opportunity costs should be considered. An opportunity cost is defined as: "The cost of using a resource in a particular service or mode of care is not the money cost or price of the resource, but is the benefit foregone (or opportunity lost) by losing its best alternative use." (Knapp, 1984). The opportunity cost for this patient was £25,905.58 per 180 days.

There is an alternate way of estimating opportunity costs. Using the same example of an

	DIRECT COSTS	£
MEDICAL SUPPORT	Standard Cost x No. of Days (8.29 x 180)	1492.00
NURSING SUPPORT		
Qualified Staff	Standard Cost x No. of Days (25.24 x 180)	4543.00
Student Nurse (3rd Year)	Average Cost x No. of Days (1.49 x 180)	268.00
RADIOGRAPHIC SUPPORT	Standard Cost x No. of Days (2.892 x 180)	507.60
PHYSIOTHERAPY	Standard Cost x No. of Days (2.46 x 180)	442.80
PARAMEDICAL AND DIAGNOSTIC SUPPORT	Standard Cost x No. of Days (5.83 x 180)	1049.40
MEDICAL AND SURGICAL SUPPLIES AND EQUIPMENT	Standard Cost x No. of Days (7.47 x 180)	1344.60
SPECIAL BED HIRE	Weekly hire rate x No. of weeks plus delivery/installation and collection	
"Clinitron"		3560.00
"Pegasus"		525.00
NON-PHARMACEUTICAL SUPPLIES	Item Cost x No. of Items Utilized	
Silastic foam	(81.16 x 2)	162.32
Granflex Dressing	(13.77 x 18)	247.86
PHARMACEUTICAL SERVICE & SUPPLIES	Standard Cost x No. of Days (2.58 x 180)	464.40
Special Drugs	Average Cost x No. of Days (3.21 x 180)	577.80
Sugar Paste (specially made)	Item Cost x No. of Items Utilized (21.60 x 2)	43.20
C.S.S.D.	Standard Cost x No. of Days (1.01 x 180)	181.80
OPERATING ROOM COSTS	Standard Cost x No. of Days (14.65 x 180)	2637.00
MISCELLANEOUS DIRECT SERVICES	Standard Cost x No. of Days (0.79 x 180)	142.20
	<b>INDIRECT COSTS</b>	
"OVERHEADS" — plus transport, Catering, Housekeeping Services plus lighting, heating, etc.	Standard Cost x No. of Days (42.87 x 180)	7716.60
<b>TOTAL COST</b>		<b>£25,905.58</b>

TABLE • I

elderly patient with Grade IV pressure ulcer, we can calculate how many other patients did not receive care because this patient required prolonged care. The following three calculations present the reasoning of an alternate way of estimating opportunity costs.

1. The Standard Cost per inpatient orthopedic day is £112.06. If this standard cost is divided into the aggregate cost of direct and indirect care and services for the patient with a Grade IV pressure sore we arrive at the total number of standard inpatient days that

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could have been utilized. i.e.,

$$\frac{25905.58}{112.06}$$

or

$$\frac{\text{TOTAL DIRECT AND INDIRECT COSTS}}{\text{STANDARD COST PER I/P DAY}}$$

231 STANDARD I/P  
DAYS

If you subtract the number of days that a patient with a Grade IV pressure sore utilized (180) from the standard inpatient days (231), we incur 51 lost patient days, by foregoing the usage by other standard orthopedic patients. In other words, we have foregone the benefit of 51 extra (Standard Cost) inpatient days, that could have been put to alternative use.

2. The standard number of days per standard case is 10.9 days. If this Standard time period is divided into the number of days that a Grade IV pressure sore patient utilizes (180), we arrive at the standard number of cases that could have been treated had the bed not been occupied by one case.

$$\frac{180}{10.9}$$

or

$$\frac{\text{NUMBER OF DAYS UTILIZED BY GRADE IV PATIENT}}{\text{STANDARD NO. OF I/P DAYS}}$$

=

17 STANDARD CASES

Hence, the alternative usage of one patient's bed over a time span of 180 days, could have increased throughput by 16 more cases — say for hip or knee replacements at an average case stay of 10.9 days. The foregone benefit, then, that is denied us is 169.1 standard patient days.

3. The standard cost per one patient case is £1216.67: if this standard cost is divided into the aggregate cost of direct and indirect care, we arrive at the number of standard cases (per financial cost) that have been foregone, i.e.

$$\frac{25905.58}{1216.67}$$

or

$$\frac{\text{AGGREGATE COST OF STAY FOR GRADE IV PRESSURE SORE PATIENT}}{\text{STANDARD COST PER CASE}}$$

## 21 STANDARD CASES

Whereas the previous example shows the number of standard cases lost or foregone relative to time, this example shows the number of standard cases that have been lost (reduced throughput) in terms of comparative standard cost. The foregone benefit that is denied is 20 standard cases.

Although this is only one patient, the financial arguments for investing in a pressure sore prevention program appear convincing. As our knowledge about pressure ulcers constantly increases, we must strive to increase their priority as a healthcare issue. The increasing number of elderly within the population are likely to focus attention on the problem of pressure ulcers. We hope this focus leads to effective prevention plans, since the cost of prevention is always less than the cost of treatment.

## A prevention plan for a health district

Most pressure sores can be prevented if there is an active prevention plan known and implemented within the district. In this example, the district comprises all the healthcare agencies and all community nursing within the city of London and environs. The elements of an effective prevention plan are discussed under the topics of assessment, equipment, mattress replacement, and education.

The first element is a method for predicting which patients are most likely to develop pressure ulcers. There are many assessment tools for predicting risk for pressure ulcers; perhaps the best known is the Norton Score (Norton, 1962). Patients need to be identified as being at risk on admission, and an individual plan of prevention should be instituted within one hour. The assessment scales rate external indicators of risk such as activity, mobility, incontinence, mental condition, and physical condition. The Norton Scale uses a

rating of 1 for worst and 4 for best. This and other similar scales are a general indicator of risk, not a precise measurement for each external indicator. Because of this imprecision and if vigorous prevention measures are initiated, many patients do not develop pressure ulcers. On the other hand, some patients who are not at risk on admission according to the assessment scale may develop pressure ulcers as their condition changes. Using assessment scales on a once only basis will not adequately prevent pressure ulcers, because the indicators of very ill patients will vary. More efficient systems for prevention may be required at different times in the patient's illness. Patients who have permanent neurological damage will require constant vigilance and support for an intercurrent illness, such as an infection, or a transfer to another care setting. At the present time 25-30% of hospital- and community-nursed patients require a prevention plan. Nurses' time and materials required for prevention might be reduced if assessment scales were more precise. More data needs to be collected on the extrinsic factors and the intrinsic factors which contribute to the formation of pressure ulcers. More emphasis on prevention could change the economics of pressure ulcers.

The second element of a prevention plan relates to the equipment required for both hospital and community patients. To prevent and treat pressure ulcers in a large district requires approximately the following:

Large cell ripple mattress	300
Spenco mattresses	400
Pegasus airwave beds	60
Clinitron beds	5
Fleeces	600
Incubator pads	6
Wheelchair cushions	100

This equipment is not, of course, purchased all at the same time but a stock gradually built up over the years. There needs to be within the organization a system of assessing

the need for new equipment by replacing old and outdated equipment. This process needs to be in the forward planning and budgetary planning of the organization. Management boards need to have demonstrated to them the benefits of prevention. It is, also, not difficult to present a good case for the purchase and in-house maintenance of some equipment rather than continually renting.

A mattress replacement program also should be in operation. The continual use of the standard mattress distorts the foam and offers no protection for vulnerable patients since grounding can occur. This basic piece of equipment is frequently overlooked and is used beyond its working life in most hospitals. There should be a mattress renewal program ensuring that every mattress is replaced at least every five years. It is also worth considering placing Vaperm mattresses where there are more vulnerable patients, such as the wards for the elderly, oncology and intensive care beds. These are more expensive but will give greater comfort and protection while reducing the need for the other support systems.

All equipment must be available to staff when needed. It is vital that pressure relieving aids are available at any time during the 24 hours. This equipment must be kept in good repair. Therefore each district will need maintenance arrangements for all equipment to be cleaned and serviced. These costs for maintenance will save money by providing a longer period of service for all equipment.

There is another reason for investing in efficient support systems that not only will prevent pressure ulcers, but also will minimize turning and lifting of patients. That is the health and well-being of the nurses and other care givers. Back injury is the largest identifiable health hazard affecting nurses. Heavy and immobile patients require an efficient support system for their own care and to prevent back injury. The greatest number of nurses' back

injuries occur in the medical, orthopedic and geriatric wards. Research by the General, Municipal & Boilermakers Union (GMB) found in the course of one hour's work, two nurses in a geriatric ward lifted the equivalent of 2.5 tons of weight. The provision of hoists for wards, as well as for individual patients at home, would do much to keep nurses healthy, prevent absence for back injury, and provide better care for many patients who are at risk for developing pressure ulcers.

The provision and maintenance of equipment contribute to the health of nurses in another way. They often feel guilty and distressed when a patient develops pressure ulcers for they know many consider pressure ulcers a failure of nursing care. This is unfair. Research has indicated that poor equipment, delays in the process of care and lack of knowledge contribute to pressure ulcer formation.

The third major element of a successful pressure ulcer prevention plan is education. The cost of education for the healthcare team may seem large, but the consequences of widespread knowledge of prevention and treatment will more than pay for the costs of education through the diminution of pressure ulcers. All staff need to know how pressure ulcers develop and how even an hour's delay in initiation of care can contribute to pressure ulcers. The staff also need guidance and expert support in treating pressure ulcers. This can be provided by hiring a specialist nurse who can make recommendations for caring for difficult patients, monitor the use of various pieces of equipment, and initiate research studies.

Another aspect of education is that of teaching vulnerable patients who have long-term problems. Helping them establish prevention plans can be very cost effective and save them much suffering. It would also be cost effective for them to have their own equipment which goes with them whenever hospitalization occurs. Many

patients and families already know the common causes of pressure ulcers and are ready to sue if pressure ulcers develop because acceptable standards of care were not implemented. Recently awards have been in the region of £100,000. These awards will consume more of the district's health budget than education for the team and nurse specialists will.

Information systems are essential in every health district in order to monitor the incidence and severity of pressure ulcers. These data can be used to determine the most effective care and support systems. These data can also form the basis for education of both vulnerable patients and the healthcare team.

The resource consequences of prevention are only part of the evaluation of a prevention program. When direct and indirect costs are calculated and compared to opportunity costs, the need for more vigilance in preventing pressure ulcers is clear. Assessing the potential of patients to develop pressure ulcers, having a plan for acquisition and maintenance of equipment as well as a routine mattress replacement, and educating the health team and vulnerable patients will reduce the enormous costs of pressure ulcers. Even if prevention did not lead to a net saving in resources, it would still be justified by the health benefits for citizens.

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