PRESSURE SORES IN ELDERLY PATIENTS
THE EPIDEMIOLOGY RELATED TO HIP OPERATIONS
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The prevalence and onset of pressure sores was studied in 283 patients admitted to a general hospital with either fracture of the proximal femur or for elective hip surgery. Ninety patients developed pressure sores, of which 60 are reported in detail. Most were in women aged 70 or more who had been admitted with hip fractures.

The majority of pressure sores started soon after admission, particularly on the day of operation, after which the numbers of new cases decreased. Half the patients had more than one pressure sore and the commonest sites were the sacrum, heels, and buttocks. The mortality in patients with pressure sores was 27% and their mean length of stay in hospital far exceeded that of other patients. The prevention of pressure sores in elderly patients requires more skill and attention than the nurse alone can offer; it demands the help of the whole orthopaedic team.

Orthopaedic textbooks cite pressure sores as a common complication of orthopaedic operations (Apley 1977). But orthopaedic surgeons have displayed little other interest in the subject. In hospital, the prevention and management of pressure sores, otherwise called bedsores or decubitus ulcers, is generally left to nursing staff; when sores do appear (Figs 1 and 2) they are usually attributed to defective nursing, although this is a partial and unscientific explanation.

![Fig. 1](image1.png)

Figure 1 — A severe sacral pressure sore which had developed over 28 days in a 91-year-old diabetic woman. Figure 2 — A typical pressure sore of the heel with a necrotic centre and surrounding erythema.

![Fig. 2](image2.png)

1976; Barbenel, Forbes and Lowe 1983; Krouskop 1983). The ulcer must result from the interplay of two sets of factors: the extrinsic mechanical forces on skin and soft tissue over bone; and the intrinsic susceptibility to tissue breakdown, itself influenced by both systemic and local conditions (Barton and Barton 1981; Torrance 1983).

Ulcers caused by pressure can extend to underlying bone, and in extreme cases may need operative treatment (Reid 1983). But even the smallest lesion will cause distress to the patient, provide a route for infection (Torrance 1983), complicate recovery, greatly increase nursing time, effort and costs (Bliss, McLaren and Exton-Smith 1967) and may significantly delay discharge from hospital (Hibbs 1982). Apart from some reports on geriatric patients (Bliss 1964; Norton, McLaren and Exton-Smith 1975; Exton-Smith 1983), the bulk of clinical research on pressure sores has been on young paralysed patients (Kenedi et al. 1976; Barbenel et al. 1983). The findings in this group cannot be extrapolated; methods of preventing pressure sores are likely to work only when they are designed for specific groups of patients (Barton 1981). The need for research into bedsores in orthopaedic patients is evident from the increased number of beds they occupy, and the considerable morbidity from pressure sores in orthopaedic wards.

Much orthopaedic surgery is performed on the elderly, and correlation between advanced years and high rates of bedsores is established. Two large studies (Jordan and Clark 1977; Jordan, Nicol and Melrose 1977) involving entire health districts showed that 67% and 82% of patients with pressure sores were aged 70 or over. Demographic studies predict a steady increase in the aged population, especially those over 75 years of age, until at least 1991 (Carstairs 1981), after which a levelling off will leave a “bulge” of the very elderly. The
commonest type of fracture in these patients is of the hip and proximal femur (Knowelden, Buhr and Dunbar 1964) and it is clear that the orthopaedic surgeon will have to treat more and more very elderly fracture patients, as well as “less elderly” patients requiring elective hip replacement and similar operations. These patients will all present a high risk of pressure sores.

Orthopaedic wards already contain a higher proportion of patients with pressure sores than those of any other specialty. The previously mentioned district reports showed 11.9% and 19.2% incidence in orthopaedic wards as against 8.8% and 9.2% in all inpatients in the district (Jordan and Clark 1977; Jordan et al. 1977). Two nursing studies reported incidences of pressure sores of 20% and 24% in patients newly admitted to orthopaedic units (Roberts and Goldstone 1979; Woodbine 1979). Jordan et al. (1977) also reported the diagnosis at the time of admission; of 19 patients with hip fractures, 42% had pressure sores. Barton and Barton (1976) found pressure sores after operation in 31% of patients with total hip replacements and in 27% who had operations for hip fracture.

Hip fracture and hip replacement are two of the most common reasons for orthopaedic admission, and are particularly associated with the secondary development of pressure sores (Norton 1979; Barton 1981). No systematic account is available of the distribution of pressure sores, or the pattern of their onset and course in these two groups of patients. This paper therefore sets out to give such an account.

HOSPITAL BACKGROUND

The hospital on which the study is based forms part of a teaching group, and is located in a poor inner-city area of the East End of London. The population of the area suffer many social deprivations and have a poor level of general health, with elevated mortality and morbidity indices from cradle to grave. Orthopaedic services in the hospital are provided by four consultant surgeons and their teams, using 55 orthopaedic beds in two female and one male ward.

Ward bedding and equipment, and nursing routines and methods, are important considerations. Beds are recent Nesbit Evans models of the King’s Fund type with Polyfloat mattresses; these allow some moulding to the shape of the patient and are advertised as providing surfaces which will reduce local pressures. Nursing fleeces and specially designed low footcradles are used routinely to provide local relief of pressure. Mechanically powered alternating-pressure mattresses are available on request from hospital stores. The level of supply and the efficiency of servicing are currently being improved.

A nursing programme for the prevention of pressure sores, directed by the unit nursing officer, has been in action for four years (Hibbs 1982). This consists of assessment of the risk of pressure sores, according to the Norton scale (Norton et al. 1975), for every patient on admission. A weekly registration is made of all patients assessed as being “at risk” as well as of those with definite sores. A nursing officer monitors this information and advises on management. For patients with a high risk, preventive care includes manual relief of pressure every two hours by lifting the patient off any pressure point, or by turning where this is possible. Those who can leave bed are mobilised regularly. The author observed that 40% of all nursing time on day shifts was devoted to these activities. The rigorous pursuit of such regimes must obviously depend on the quantity and quality of staff available, and at night the staff levels are very much reduced.

PATIENTS AND METHODS

Information for this survey was obtained from the unit nursing officer’s register of pressure sores, the patient’s case notes and from other nursing and hospital sources. This retrospective survey covers one calendar year from May 31, 1981. All patients admitted for elective or unplanned operations to the hip and femur were studied.

There were 283 patients aged from 14 years to 99 years, of which 73% were aged 60 years or over, and 63% were over 70 years of age; women predominated by two to one. Eighty-two per cent of admissions were for trauma, most often for fracture of the hip or proximal femur; the remaining 18% were admitted for elective surgery, mostly total hip replacement. Only 22 patients were treated conservatively, so 261 patients had an operation. Operations were recorded according to the classification of surgical operations published by the Office of Population Censuses and Surveys (1975). The most common operations were: internal fixation of hip or femur 35%, hemi-arthroplasty of hip 28%, and total hip replacement 17%. The remaining patients had a variety of other operations including the removal of hip replacement components and of internal fixation devices, while two patients had arthrodesis of the hip. Slightly more hips were replaced in men than in women, but twice as many hemi-arthroplasties of the hip were done for women than for men. Information on mortality was fragmentary and therefore was not used.

RESULTS

Of the 283 patients studied for this paper, 157, or just over half, were assessed on the Norton scale (Norton et al. 1975) as being “at risk” of pressure sores and so requiring special preventive nursing care. Of these, 90 patients developed ulcerative pressure lesions, which is 32% of the whole group.

Of these 90 patients with pressure sores, some information was lacking in the records of 30 (26 women and 4 men); these were excluded from further study, leaving a reduced sample of 60 patients. This group had the same sex ratio as the original 90 but the mean age of female patients was reduced from 82.4 in all patients with bed sores to 78.5 in the patients who were followed up.
Thus some of the oldest and most sick patients with the worst pressure sores were excluded from analysis; this needs to be borne in mind.

**Age and sex.** The youngest sufferer from pressure sores in this series was 62 and the oldest was 99 years old. Of the 60 patients only 10% were under 70 years of age, 32% were between 70 and 79, 58% were over 80 and 12% were over 90 years old. Twice as many women as men were admitted during the study period, but four times as many women as men had pressure sores. This preponderance of women with pressure sores appears to be closely associated with age, and Table I shows that the high proportion of women with pressure sores continues to increase with advancing years.

**Table I.** Age and sex of 60 patients with pressure sores

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>60–69</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>70–79</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>80–89</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>90–99</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12</td>
<td>48</td>
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**Type of admission.** From the point of view of immobilisation and bedrest in hospital, patients with fractured hips and those admitted for elective hip surgery should be equally liable to develop pressure sores. But while the whole group of admissions contained four times as many acute as planned cases, there were 10 times as many acute admissions among the pressure sore patients. In fact, 92% of all patients with pressure sores had been admitted for fracture of the hip or proximal femur.

**Onset.** Pressure sores may appear at any time during the period in hospital, but the timing is not random. We recorded the date of the first pressure sore in each patient and related it to the dates of admission and operation. This showed that the first onset is often at the beginning of hospitalisation; 17% of patients already had a sore when they were admitted, 34% developed lesions in the first week, and a further 24% of the group developed sores in the second week, after which no special pattern was discernible.

There was also a relationship between the date of the first sore and the date of operation. It was found that 18% of the patients with pressure sores had had an ulcer before operation. The largest number (16%) of new diagnoses of pressure sores on any one day was on the day of operation. Another 30% were diagnosed during the first week after operation, with only 13% in the second week.

**Type and number of sores.** All pressure sores reported during the survey were included even where there had been more than one crop of lesions. The severity of the ulcers was not graded systematically, but a record was made of breakdown into the epidermis and dermis, the Grade 2 lesions of David (1981), as well as deeper penetrating ulcers. The 60 patients studied had a total of 124 separate pressure sores. About half the patients had more than one sore, while 17% of the men and 29% of the women had three or more sores. These pressure sores were distributed as follows: sacrum 45%, heels 23%, buttocks 15%, calcaneal tendon 8%, and the remainder at other sites overlying the spine, hip, leg and foot.

**Death.** No figures were available for death rates in the orthopaedic unit as a whole, but of the 60 pressure sore sufferers 16 (27%) died during the course of the survey, all except one being women. Pressure sores often appear in the dying patient, but in this series there was no regular association between the date of developing a sore and the date of subsequent death, only six patients dying within a month of developing a sore.

**Length of stay.** The mean length of stay in an orthopaedic bed in the hospitals of this region (the East End of London) ranges from 15.9 days to 21.6 days (North East Thames Regional Health Authority 1981). The patients with pressure sores in this study, excluding those who died, had a median length of stay of 60 days, a considerably greater period. Excluding the 6 patients who were still in hospital at the end of the survey, the 16 who had died, and 2 patients who had sores long before they were admitted, 17 of the remaining 36 patients were discharged within one month of developing a pressure sore, and 7 within two months; 12 patients remained in hospital for between three and six-and-a-half months after developing pressure sores.

**DISCUSSION**

The patients here reported represent an elderly population with orthopaedic problems from a deprived inner-city area. There are no previous reports on orthopaedic patients but there are several points of comparison with other papers. The prevalence of pressure sores is higher than the 24% of 250 admissions found in a geriatric unit by Norton et al. (1975). In that report the development of pressure sores after admission resembled that found in this study, with 34% occurring by the end of the first week, and 70% of all cases by the end of the second week in hospital. Other papers have reported that the incidence of sores rises steadily with age (Norton 1979). Barton and Barton (1981) reported that smokers are four times more likely to develop sores than non-smokers, and also identified different patterns of distribution in men and women.

The finding in this review that approximately twice as many patients with fractures as patients having elective surgery developed pressure sores, probably reflects differences in age and health between the two groups. Selection for planned hip surgery is made in the expectation of a satisfactory result and the patients are generally younger and fitter than those who fall and sustain a fracture of the hip or femur. Falls and fractures in the elderly are frequently associated with underlying systemic diseases (Brocklehurst et al. 1978; Ceder,
Elmqvist and Svensson 1981) and the six-month mortality in elderly patients after sustaining a fractured hip can reach 40% (Baker, Duckworth and Wilkes 1978).

Causal connections between operation and the incidence and onset of pressure sores are obscure and probably involve many factors. In the present study no statistically significant relationship could be established between such pairs of variables as: the type of operation and the incidence of pressure sores, the time spent in hospital awaiting operation and the date of developing a sore, or the site of the pressure sore and the type of operation. Petersen (1976) found clinical evidence of tissue damage immediately after operation, whilst Barton and Barton (1976) reported a significant reduction in the incidence of pressure sores after operation when 80 µ of corticotrophin was given to patients having total hip replacement or being treated for femoral fractures. They claimed that corticotrophin stabilised the microcirculation to the soft tissues, thereby increasing resistance to pressure during operation; their study has not been repeated and further research is needed. An unusual site for a pressure sore, noted in this study, was behind the calcaneal tendon. This was traced back to the use of ill-fitting traction boots on the fracture table in the operating theatre, and it was possible to correct this fault.

The majority of the sites of pressure sores were consistent with pressure produced by periods of immobilisation in a recumbent or semi-recumbent posture. Of all these sites, sores at the heel are especially painful and can take several months to heal. Open sores obviously delay discharge either to home or to other accommodation for the elderly.

The effective management of the elderly patient with a view to the prevention of pressure sores requires more expertise than the nurse alone can offer. Pressure sores are multifactorial in origin, and reduction of their incidence demands the skills of all of the orthopaedic team in three areas: research; patient management; and the provision of beds, tables and equipment which can minimise local pressure on the less mobile patient in hospital. Nurses would welcome interest from medical and surgical staff, patients would benefit, and surgeons would be less likely to find their patients deteriorating with a pressure sore after otherwise successful operations.

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REFERENCES


Barton AA. Pressure sores described. Care, science and practice 1978:7-9.


Norton D. Extent and nature of the problem. Paper given at a conference on The Prevention of Pressure Sores, organised by the Nursing Practice Research Unit and the Department of Health and Social Security; held at Northwich Park Hospital, June 1979.


