Improving Health Outcomes
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Alastair McColl, Paul Roderick, John Gabbay
Hip fracture in South Lancashire

Geographical Area covered: Lancashire
Focus: Case studies focusing on the use of national indicators

Contributors:
Authors: Steve Kisely, Lecturer in Public Health Medicine*
Shelagh Garnett, Consultant in Public Health Medicine
Address for correspondence: South Lancashire Health Authority, Grove House, Langton Brow, The Green, Eccleston, Lancashire PR7 5PD.
(* Currently consultant in Public Health Medicine, Birmingham Health Authority)

Editorial comments on how case study is linked to improving health outcomes: (also published in Volume 1)

Hip fracture was chosen because of the high accident mortality rates in people over 65 years old in the district. A high proportion of those deaths occurred following hip fracture. The high mortality rate was not explained by a higher incidence of hip fracture. It was not possible to make conclusions on the case fatality rates at individual provider units due to small numbers and possible case mix variations. However, routine HES data suggested that one third of patients were being operated on more than two days after admission. Guidelines for the treatment of hip fractures are being agreed and introduced into clinical audit in local trusts, as well as into the monitoring of contracts. Primary prevention measures have also been introduced.

Abstract (also published in Volume 1)

This report details the approach of South Lancashire Health to the use of health outcome indicators for patients who are admitted with hip fracture. The area was chosen because of the high mortality rates for accidental death in people over 65 years old in the district, the Standardised Mortality Ratio (SMR) in 1993 being 171. A high proportion of these deaths occur following hip fractures.

Fractures of the hip are a major public health problem, and are mainly caused by osteoporosis and an increased tendency to fall in the elderly.

As regards primary prevention and screening, interventions have centred around reducing the incidence of osteoporosis or preventing the occurrence of falls.

On the basis of the current literature, the Health Authority has targeted interventions at two particular groups: the elderly, and younger patients with early menopause or secondary osteoporosis.

In the elderly the emphasis has been on reducing accidents and falls by working with local authorities, primary health care teams and the voluntary sector. This includes assessment of nursing homes, modification of housing and day centres, as well as attention to medication. In addition, the use of dietary supplements in sheltered housing, residential homes and nursing homes is being promoted.

In younger patients, there is sufficient research evidence for the purchase of scans for patients with secondary osteoporosis and those with strong risk factors. Guidelines are being agreed with GPs, endocrinologists, gynaecologists and orthopaedic surgeons to whom these patients are likely to present.

As regards secondary and tertiary prevention, guidelines for the treatment of hip fractures are being agreed and introduced into clinical audit in local Trusts, as well as into the monitoring of contracts.

Assessing outcome in terms of mortality at individual provider units is subject to factors such as random fluctuation because of insufficient numbers, and confounding due to variations in case mix or differences in the completion of death certificates.

Variations in death certification can be controlled for using case-fatality ratios of the percentage of admissions with hip fracture which have a discharge code of "death", but this measure is still subject to insufficient
statistical power and variations in case-mix.

Measuring outcome may be more sensitively assessed using process measures which have been shown to influence outcome and which are routinely collected. Measures that are being considered in consultation with provider units include the numbers of patients admitted from home who actually return home, the time interval between admission and surgery, use of anti-coagulants and antibiotics, and percentage infection rates.

**Introduction:**

**Why this clinical area was chosen:**

This area was chosen by South Lancashire Health because of the shared concerns of purchasers, providers and local GPs about the high mortality rates for accidental death in people over 65 years in the district. For instance, the Standardised Mortality Ratio (SMR) for the district in 1993 was 171 (South Lancashire Health Authority 1994). A review of data from certified causes of death revealed that a high proportion occurred following hip fractures. Of the 49 deaths due to accidents in the over 65’s that were recorded in the district, 35 (71%) were due to fractures of the femur or pelvis.

Hip fracture is one of the commonest cause of morbidity and mortality in the over 65’s especially amongst women. This condition affects 57,000 people annually, at an estimated cost of £250m for hospital care alone (Kisely 1996).

Theoretically possible explanations for the increased mortality rates in South Lancashire were:
- that they were an artefact of different death certification practices in different hospitals. For example, it may be that death certificates were more accurately completed than elsewhere with consequent greater coding of deaths as accidents due to fractures rather than as the generic category of bronchopneumonia;
- that a greater proportion of local residents with femoral fractures die post-operatively than is the case elsewhere (i.e. local providers have high case-fatality rates);
- that the overall incidence of femoral fracture in South Lancashire was greater than elsewhere.

**Further information that was required:**

**Introduction**

A detailed review of the epidemiology of hip fracture was undertaken using national and local data. Data sources included the Public Health Common Data set and Contract Minimum Data set. Published sources that were reviewed included the report by the Royal College of Physicians (Royal College of Physicians 1989), the study of Population Health Outcome Indicators (McColl and Gulliford 1993), and a report by the Audit Commission (Audit Commission 1995). A search of the scientific literature was undertaken using Medline and the relevant papers reviewed.

**Definition**

For the purposes of this review, hip fracture was defined as a fracture of the neck of femur (ICD 820) and fracture of other specified parts of femur (ICD 821).

**Morbidity**

**National data:** The vast majority of patients with hip fractures are admitted and treated in hospital. Hospital Episode Statistics (HES) on admissions to hospital are therefore the most accurate source for the incidence of hip fracture in England and Wales (McColl and Gulliford 1993; Hollingworth et al. 1995). The annual number of hip fractures is 56,613 (11.8 per 10,000 population) (Hollingworth et al. 1995).

The incidence of hip fracture is increasing steeply even taking into account the growing proportion of the population who are elderly (McColl and Gulliford 1993; Audit Commission 1995; Hollingworth et al. 1995). The reason for this increase is unclear. Although the most recent evidence suggests that the rise in age specific incidence may have abated, it seems likely that the total incidence will continue to increase as the population of elderly people at risk grows. The lifetime risk that a women will suffer a fractured hip before the age of 85 is currently 12% and for a man it is 5%.

**Local data:** HES data showed that the number of admissions with femoral fracture in South Lancashire was 10.8 per 100,000, which was slightly lower than the national average. This was confirmed by the age-standardised hospital episode rate in the over 65’s. The rate for England and Wales was 544.97 per 10,000 residents over the age of 65. This compares to 515.6 for West Lancashire and 459.1 for Chorley & South Ribble. The 95% confidence intervals (CI) (West Lancashire 95% CI=374.6-656.6; Chorley & South Ribble 95% CI=370.6 -547.7) indicated that the admission rate in the district is not significantly higher than the
national average.

Age specific incidence rates for South Lancashire from 1993 to 1995 were broadly similar. In comparison with the national data, the rates for males and females were again comparable to the national average (Hollingworth et al. 1995).

**Risk factors:** Hip fractures are primarily a disorder of elderly women (McColl and Gulliford 1993; Hollingworth et al. 1995). 87% of patients admitted with this condition are over the age of 65, and 82% of those are female. Fractures arise from an interaction between osteoporosis and accidental falls.

Risk factors for osteoporosis include (McColl and Gulliford 1993; Audit Commission 1995; National Osteoporosis Society 1995):
- increasing age;
- female gender;
- a genetic predisposition;
- poor early nutrition in childhood and adolescence;
- the onset of menopause in women and in particular early age of onset;
- decreased exposure to sunshine;
- a low intake of vitamin D;
- insufficient dietary calcium;
- alcohol & cigarette use;
- caffeine consumption;
- low body weight;
- lack of regular exercise;
- amenorrhoea associated with oestrogen deficiency;
- any gynaecological problem or intervention that interferes with normal oestrogen production such as bilateral oophorectomy in pre-menopausal women;
- corticosteroid induced osteoporosis.

These risk factors suggest that the following subjects are most at risk for osteoporosis:
- patients with early natural, surgical or radiation induced menopause;
- women and men who have been on long term courses of steroids;
- patients with Cushings Syndrome;
- those with secondary oestrogen deficiency and anorexia and other eating disorders;
- those with strong family histories;
- patients with hyperthyroidism;
- those with liver disease or malabsorption;
- male hypogonadism;
- transplant patients.

**Mortality**

**National data:** Fracture of the hip is an important cause of mortality. In 1990 there were 1,529 deaths in England and Wales due to hip fracture (McColl and Gulliford 1993). The case mortality rises with advance in years, being 6% for 65-69 year olds, 30% for 85-89 year olds, and 61% for those aged over 95. Men appear to have a worse prognosis.

**Local data:** Fractures of the hip account for over 70% of deaths due to accidents in the population of South Lancashire that is over 65 years old. Table 1 shows the overall Standardised Mortality Ratios for accidents in the over 65's for the last three years as well figures for males and females. These have been consistently elevated for all categories although there has been a decline in ratios especially for males. Although later figures have shown an improvement in comparison with the national average, the directly age standardised rate for 1994 remained statistically elevated in terms of 95% confidence intervals (CI) (national rate of 51.9 per 100,000 (95%CI =50.9-53.0) v South Lancashire rate of 82.2 per 100,000 (95% CI=64.3-100.4)).

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Males</td>
<td>182</td>
<td>167</td>
<td>107</td>
</tr>
<tr>
<td>Females</td>
<td>178</td>
<td>172</td>
<td>164</td>
</tr>
<tr>
<td>Total</td>
<td>175</td>
<td>171</td>
<td>144</td>
</tr>
</tbody>
</table>

**Outcome of treatment**

**National Data:** More than 97% of hip fracture patients have surgery to repair their fracture (Todd et al. 1995). Most patients do very well. However hip fracture is an important cause of mortality. In 1990 there were 1,529 deaths in England and Wales due to hip fracture (McColl and Gulliford 1993).

A large number of factors appear to be associated with mortality following hip fracture; these can be divided...
into patient based and treatment based variables (McColl and Gulliford 1993; Hollingworth et al. 1995; Todd et al. 1995).

**Patient based factors include:**
- male sex;
- older age;
- physical co-morbidity, particularly cardiovascular disease but also impaired locomotor function and mental health problems.

**Treatment based factors include:**
- experience and specialty of surgeon;
- early intervention following admission;
- pre-operative assessment of health;
- post operative planning within 4 days;
- early mobilisation;
- prophylactic measures against femoral thromboembolism;
- prophylactic antibiotics;
- the existence of close working relationships between surgeons and physicians; 'orthogeriatric liaison'.

There have been concerns about the use of mortality rates as a local outcome measure because of statistical power given the small number of deaths in individual provider units (Mant and Hicks 1995). There is also the problem of case-mix and the need to take into account other factors affecting prognosis such as age, sex and significant co-morbidity (Bedford 1996).

Measuring outcome may be more sensitively assessed using process measures which have been shown to influence outcome and which are routinely collected.

An audit comparing differences in mortality after hip fracture between different provider units in East Anglia investigated the importance of all of these factors (Todd et al. 1995). 97% of admissions were treated surgically, 45% received thromboembolic prophylactics, and 93% pre-operative antibiotics. Mortality at 90 days was 18% but ranged from 5 to 24% between different hospitals. Being older, having a lower level of day activity, being male, and having a history of cardiovascular disease all emerged as important determinants of mortality. One particular hospital had a much higher survival rate and the authors concluded that this appeared to be due to the overall package of care offered by the hospital as individual elements of that package did not independently predict outcome.

Delays in intervention can occur at a number of stages. In spite of guidelines issued by the Royal College of Physicians recommending that patients with hip fracture wait no more than one hour in Accident & Emergency, most patients appear to wait longer (Royal College of Physicians 1989).

There is also evidence that discharge planning for patients is poorly documented. Areas that could be covered might include specification of a target discharge date, assessment and planning of support needed at home in conjunction with other relevant agencies, and involvement of patients and their relatives.

**Local data:** It was difficult to interpret case fatality rates from individual providers’ HES data as these showed a wide variation in relation to other providers in the district and within the old North Western Region. However the figures were small and therefore subject to random variation. They may also be susceptible to variations in case-mix as morality rates are significantly higher in the over 85's, males and the presence of medical co-morbidity.

Information about process indicators derived from HES data was more easy to interpret. About 83% of patients presenting to the surgeons went to theatre. Of patients who underwent surgery, approximately 50-60% went to theatre on the day of presentation or the day after. There was little variation between individual units, other than for a low rate of surgical intervention in patients admitted to Unit 3 (Tables 2a and b). It is unclear whether the comparatively low rate of surgical intervention is due to incomplete data, case-mix or surgical practice, and this will be audited in consultation with providers.

**Table 2a: Time from episode start to time of operation (1993-1994)**

<table>
<thead>
<tr>
<th>Time from start of episode to surgery</th>
<th>Setting</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th>% of surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unit 1</td>
<td>Unit 2</td>
<td>Unit 3</td>
<td>Unit 4</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>No operation</td>
<td>28 (13%)</td>
<td>18 (16%)</td>
<td>11 (61%)</td>
<td>1 (12.5%)</td>
<td>53 (15%)</td>
<td>-</td>
</tr>
<tr>
<td>Within one day</td>
<td>103 (47%)</td>
<td>40 (35%)</td>
<td>3 (17%)</td>
<td>5 (62.5%)</td>
<td>151 (42%)</td>
<td>50%</td>
</tr>
<tr>
<td>2 - 7</td>
<td>48 (22%)</td>
<td>43 (38%)</td>
<td>3 (17%)</td>
<td>1 (12.5%)</td>
<td>95 (27%)</td>
<td>31%</td>
</tr>
<tr>
<td>over 7 days</td>
<td>40 (18%)</td>
<td>12 (11%)</td>
<td>1 (6%)</td>
<td>1 (12.5%)</td>
<td>54 (15%)</td>
<td>18%</td>
</tr>
</tbody>
</table>
Table 2b: Time from episode start to time of operation (1994-1995)

<table>
<thead>
<tr>
<th>Time from start of episode to surgery</th>
<th>Setting</th>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
<th>Unit 4</th>
<th>Total</th>
<th>% of surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>No operation</td>
<td></td>
<td>27 (13%)</td>
<td>8 (8%)</td>
<td>28 (72%)</td>
<td>1 (7%)</td>
<td>64 (17%)</td>
<td>-</td>
</tr>
<tr>
<td>Within one day</td>
<td></td>
<td>129 (60%)</td>
<td>45 (46%)</td>
<td>2 (5%)</td>
<td>3 (21%)</td>
<td>179 (49%)</td>
<td>59%</td>
</tr>
<tr>
<td>2 - 7</td>
<td></td>
<td>42 (19%)</td>
<td>39 (40%)</td>
<td>7 (18%)</td>
<td>9 (62%)</td>
<td>97 (26%)</td>
<td>32%</td>
</tr>
<tr>
<td>over 7 days</td>
<td></td>
<td>18 (8%)</td>
<td>6 (6%)</td>
<td>2 (5%)</td>
<td>1 (7%)</td>
<td>27 (7%)</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>216 (100%)</td>
<td>98 (100%)</td>
<td>39 (100%)</td>
<td>14 (100%)</td>
<td>367 (100%)</td>
<td>100%</td>
</tr>
</tbody>
</table>

Conclusions
There was evidence that accident death rates for the over 65's in South Lancashire had been persistently high. These figures remained high even when controlling for the possible effects of a different age distribution from the national average.

A high proportion of these deaths appeared to be related to hip fracture.

The high mortality rate in South Lancashire was not explained by a higher incidence of hip fracture in the district. There was no evidence to suggest a significantly higher rate of admission for hip fracture in males or females than the national average taking into account the effects of age.

Measuring outcome in terms of case fatality rates from individual provider units was difficult in view of the small numbers and possible variations due to case-mix.

There was however evidence from the routine data on process measures that not all patients are operated on within 24 hours of presentation for treatment. Early intervention has been shown in the literature to reduce subsequent mortality and improve outcome.

Data validity studies:
One area of concern in the interpretation of mortality data was that differences in rates may have been an artefact of different death certification practices in different hospitals (Bedford 1996). For example, it may be that death certificates are more accurately completed than elsewhere with consequent greater coding of deaths as accidents due to fractures rather than as the generic category of bronchopneumonia. A study by Goldacre of patients with hip fracture within 4 weeks of death showed that the condition was mentioned on only 25% of death certificates, and was implicated as an underlying cause of death in only 17% of cases (Goldacre 1993). South Lancashire Health Authority is planning to include death certification practices in individual trusts into the next audit cycle.

The use of case-fatality ratios for individual providers has been advocated (Bedford 1996). It is possible to calculate the percentage of admissions with hip fracture which have a discharge code of "death". Although this may control for differences in certification practice, chance variation due to the small numbers of deaths in each provider, and variations in case-mix would still need to be considered.

It is planned to incorporate some of these factors in the programme of audit in individual provider units.

Summary findings from initial work:

Changes which were made:

Introduction
There is some uncertainty about the right balance of interventions to address risk factors for hip fracture. The two approaches consist of reducing:
- the incidence and prevalence of osteoporosis (Centre for Health Economics 1992; Advisory Group on Osteoporosis 1994);
- the number of falls in the elderly (Centre for Health Economics 1996).
As regards osteoporosis, recent reports have recommended conflicting strategies: population based prevention (Centre for Health Economics 1992), and an osteoporosis service to undertake densitometric (DXA) scanning of
certain groups of patients followed by treatment with Hormone Replacement Therapy (HRT) (Advisory Group on Osteoporosis 1994). The authors of the largest meta analysis of the relevant literature published to date did not recommend widespread screening by measuring bone density (Marshall et al. 1996).

Current and planned interventions have been chosen by South Lancashire Health Authority on the following criteria:

- interventions are evidence based;
- it should be possible to monitor outcome.

**Primary prevention and screening**

The Health Authority initially commissioned a review of the literature which recommended that primary prevention and screening should be targeted at two particular groups: the elderly, and younger patients with early menopause or secondary osteoporosis (Kisely 1996).

In the elderly the emphasis would be on reducing accidents & falls (Centre for Health Economics 1996) by working with local authorities, primary health care teams and the voluntary sector. This would include assessment of nursing homes, modification of housing and day centres, as well as attention to medication. In addition, the use of dietary supplements in sheltered housing, residential homes and nursing homes would be considered.

In younger patients, there was sufficient research evidence for the purchase of scans for patients with secondary osteoporosis and those with strong risk factors. These patients tolerate HRT better, and it is possible that by the end of the recommended duration of therapy, it may be possible to change them to alternative treatments that are currently being evaluated.

The Health Authority has recently been allocated Regional Research and Development funds to undertake further work in this area with local clinicians in primary and secondary care. The 1996/97 project will use established methods such as those of the Getting Research into Practice initiative (Meara and Blais 1994) to develop, agree, disseminate and evaluate guidelines for the management of osteoporosis and hip fracture.

The Health Authority is also working with local authorities, primary health care teams, voluntary sector in reducing the frequency of falls in the elderly. Agreed guidelines are being incorporated into nursing home inspections.

**Secondary and tertiary prevention**

Secondary and tertiary prevention concerns interventions following admission, and measures taken on discharge.

The Health Authority commissioned a second report covering immediate and long term management. This recommended the development of local guidelines based on published outcome indicators, physicians reports, and the results of a major audit undertaken in East Anglia adapted to local circumstances (Kisely 1996). Items covered in the guidelines include:

- maximum time in Accident & Emergency departments;
- treatment within 24 hours of admission;
- prophylactic anti-coagulants;
- post pre-operative antibiotics, experience of surgeon, early immobilisation and planning for discharge;
- surgical practice;
- close liaison, primary care, local authorities and the voluntary sector;
- minimum grade/experience of surgeon and anaesthetist;
- liaison with physicians of old age;
- collaboration with other relevant agencies.

The guidelines have been circulated for consultation to clinicians and audit co-ordinators in provider units, and will be incorporated into audit. The recommendations contained in the guidelines have been met with widespread acceptance.

A shortened version of the report and recommended guidelines has been published, in *Bandolier* (Kisely 1996).

**How changes will be monitored:**

**Introduction**

These will be based on routinely collected data where possible and include data collected at district and provider unit level

**District level**

The feasibility study of population health indicators (McColl and Gulliford 1993) recommended the use of:
age standardised and new admission rates for hip fracture per 10,000 population over the age of 65;
SMR's for deaths between the age of 65 and 84 caused by fracture of proximal femur;
SMR's for deaths between over the age of 85 caused by fracture of proximal femur.

Provider unit level

Primary prevention and screening: Wherever possible local clinical audit processes will be utilised for data collection. Existing practice and changes after intervention will be also be assessed using data from
- the computer based morbidity data collection project covering 45 South and North West Lancashire GP surgeries;
- postal questionnaires to GPs and hospital clinicians on opinions, referral behaviour and satisfaction with existing services adapted from previous work using criteria developed by the National Osteoporosis Society;
- a review of referrals to densitometric scanning.

Secondary and tertiary prevention (Audit Commission 1995; Todd et al. 1995): Working with clinical audit co-ordinators will allow the gathering of further information through surveys as part of audit such as:
- the number of patients from home who actually return home on discharge;
- use of anti-coagulants and antibiotics;
- the time interval between admission and surgery;
- planning for discharge at an early stage of admission;
- percentage of patients operated on out of hours;
- level of training and specialty of surgeon;
- percentage infection rates;
- liaison with physicians of old age;
- number of pressure sores;
- waiting times in Accident & Emergency Departments.

These measures have been derived from the guidelines that were previously circulated to provider units. The results will be presented in audit meetings at provider level as well as form the basis of a report to the North West Regional office of the NHS Executive as part of the North West Research and Development Scheme.

Analysis of Results

Results will be analysed qualitatively and quantitatively. In the latter case, adherence to guidelines before and after intervention will be initially examined using descriptive statistics. Changes between baseline and outcome assessments in the degree of agreement between opinions or referral behaviour, and the guidelines, will then be analysed using inferential statistics.

Resource Implication:

Internal resources required to undertake the work

The project to date has largely been undertaken by a lecturer in public health medicine (SK) on secondment to South Lancashire Health. A successful bid under the North West Research and Development scheme for £30,000 will be used to fund a full-time facilitator/project officer. This individual will undertake further development and dissemination of guidelines, as well as audit the subsequent effect on practice. Further work will be undertaken as part of routine audit in provider units.

Resource implications of changes made to service delivery

Introduction: At this stage in the project resource implications are only anticipated. The following are possible areas to be considered

Primary intervention and screening: In the area of primary intervention it would be anticipated that the recommended changes will be cost-neutral.

As regards screening for osteoporosis, there is sufficient research evidence for the purchase of scans for patients with secondary osteoporosis and those with strong risk factors This would give an annual total of 165. Costs will vary according to throughput and capital outlay but if each scan costs £48 (Compston et al. 1995), this would mean an annual expenditure of £8,000. It may be possible to reduce this figure by negotiating for the use of any spare capacity in the private sector.

Secondary and tertiary prevention: The average cost of hospital care per case is about £5,000 but this figure encompasses a wide variation in the quality of care (Audit Commission 1995). A low cost may result from a quick recovery following effective treatment, or from discharge home without sufficient rehabilitation and support. A high cost may result from a thorough rehabilitation programme, or a protracted stay due to a lack of rehabilitation and discharge planning. It is therefore not possible at this stage to determine whether savings resulting from shortening the interval between admission and surgery, or overall length of admission will be...
balanced by the additional cost of more intensive rehabilitation.

**Practical lessons learnt:**

It was important to choose an area that was recognised as being of concern to purchasers and providers alike. The introduction of outcome measures in the planning of services can only be done in collaboration with all interested parties in the health service, social services and voluntary sector.

Local and national data can be used as a focus for discussions among health care professionals and so inform the auditing of current practice.

Interventions must be evidence-based and measurable.

Disease-specific mortality may be an insensitive tool with which to assess outcome.

Measuring outcome may be more sensitively assessed using process measures which have been shown to influence outcome and which are routinely collected.

Success should be measured using existing mechanisms such as provider based audit.

**Conclusion:**

Fractures of the hip are a major public health problem, and are mainly caused by osteoporosis and an increased tendency to fall.

Interventions have centred around reducing the incidence of osteoporosis or preventing the occurrence of falls.

On the basis of the current literature, the Health Authority has targeted interventions at two particular groups: the elderly, and younger patients with early menopause or secondary osteoporosis. In the elderly the emphasis is on reducing accidents and falls by working with local authorities, primary health care teams, voluntary sector. In younger patients, there is sufficient research evidence for the purchase of scans for patients with secondary osteoporosis and those with strong risk factors. Guidelines for screening and treatment are being agreed with GPs, endocrinologists, gynaecologists and orthopaedic surgeons to whom these patients are likely to present.

Guidelines on the management of hip fractures are being developed with local clinicians, and introduced into audit in local Trusts and the monitoring of contracts.

Assessing outcome in terms of mortality at individual provider units is subject to confounding factors such as random fluctuation because of insufficient numbers, variations in case mix or differences in the completion of death certificates.

Variations in death certification can be controlled for using case-fatality ratios of the percentage of admissions with hip fracture who have a discharge cause of death, but this measure is still subject to insufficient statistical power and variations in case-mix.

Measuring outcome may be more sensitively assessed using process measures which have been shown to influence outcome and which are routinely collected.

**References:**


Organisational Context:

In common with the rest of the National Health Service, South Lancashire Health Authority has shifted the emphasis of measuring health service impact from issues of "structure" or "process" to those of outcome. This report illustrates how the Health Authority has taken a pragmatic view towards the use of health outcome indicators at population and provider levels.

Depending on the frequency of the disease or condition being considered, population based indicators may have sufficient statistical power to detect real changes in outcome but may lack the specificity required to define the impact of local health services. In these cases the use of disease-specific health outcome indicators at provider level is recommended. These may be more specific for the effect of health service interventions although they are more subject to random variation, and differences in case-mix.

The chosen health outcome indicators must be appropriate to the disease or condition in question, to its incidence and prevalence and to the expected impact of health service interventions. The impact of health service interventions should also be measureable, using routine data wherever possible.

The philosophy of the Health Authority is for multi-disciplinary working in specific project teams, using where possible existing mechanisms to effect change e.g. clinical audit and the contracting process. Public Health Physicians take a key role in the development of guidelines and standards to help inform these activities, in agreement with clinicians and general practitioners, to ensure that they are evidence-based, feasible and enjoy full support.

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